



FRIDAY, APRIL 11, 1902.

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Contributions

What is the Real Use of the Interstate Commerce Law?

Chicago, March 18.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It has occurred to even the ordinary shipper that the present agitation by the President through the Interstate Commerce Commission is inspired by the Wall Street railroad owners. Not that the President would knowingly co-operate with railroad owners to exact more for their service, but being a reformer, and having it called forcibly to his attention that the law has been violated, he no doubt has made up his mind that something decided must be done, either toward its enforcement or repeal. He has given orders intended to bring out certain facts so that Congress and the people will understand.

Injunction is the province of a court of equity. Equity, according to Blackstone, is "the correction of that wherein law is deficient." Equity then is employed where no statute law covers the case. The Interstate Commerce Law contains all that is necessary to remedy that which injunction is to be called upon to accomplish. No railroad man doubts that the Interstate Law can be enforced, should those whose duty it is to enforce it desire it. The trouble is, it is too severe and is directed at the individual instead of the corporation.

To employ injunction to prevent pools, the payment of rebates and other violations of the Interstate Law, simply says, it is not desirable to enforce the law, but something must be done; so under the pretext of accomplishing a reform, which the law plainly provides for, something new is tried, in hope that the novelty and the awe of a court will have some effect on the shipper, who has been fostered and built up by artificial conditions. During the interim the railroads profit.

Why don't they enjoin burglars? Is it thought that a burglar would be more influenced by an injunction than by the law? If railroads and shippers violate the Interstate Law, they will find a way around an injunction. Why do shippers and railroads violate the law? Because its provisions are contrary to the general customs of all trade. To be sure, there are favored shippers, but there is a great deal more in the fact that the law is not obeyed, than that the business of a few large shippers is valuable.

The wholesale and retail principles of trade are not recognized by the law. The commission has never given a decision upon the carload and less-than-carload rate difference. No one has ever found fault with this because it agrees with trade conditions, but there are those who contend that a strict interpretation of the law would do away with the carload and less-than-carload difference. The carload and less-than-carload rates stand and tend to establish in a degree the wholesale and retail principle which causes most of the violations of the much abused statute. A factory or jobbing house is established where there are no natural advantages to foster them. The railroads create artificial conditions so the industries can live, be useful distributors of the world's goods and give the line upon which they are located a double haul, i. e., the carload shipments in and the products for distribution

out. Should every one be given the same rates that large manufacturers and wholesale merchants enjoy, distribution would not be accomplished with the nicety that it is at the present time, so the law has been "bent" to conform to the laws of trade.

Suppose for a moment that the Interstate Law should be absolutely obeyed, or that the proposed injunction would really enjoin, what would happen? A very large number of the factories and wholesale warehouses would cease to exist. The railroads would be called upon to re-adjust their tariffs so as to protect these artificial and convenient creations. Trouble would begin when an attempt was made to fit the tariffs to trade conditions and the law as well. Of course there is some territory in the United States where the principle exists of charging all the traffic will bear, but there is not much left.

The railroads conduct their business very largely upon the general customs of trade, now and then temporarily working the dear people for more revenue by getting worked up and scared by operations of the Interstate Commission or by threatened injunctions.

President Roosevelt will soon find out that the present law does not fit the trade conditions of this great country, and ask Congress to repeal it.

The great railroad combinations will solve the problem of cheap transportation, no doubt, before it is realized that the Interstate Commerce Commission is an expensive luxury. The laws of trade govern mercantile affairs. Why will they not take care of the railroads? All the legislation that is necessary is that sufficient to establish maximum rates.

A COUNTRY SHIPPER.

A Remaining Weak Point in Railroad Track.

New York, March 30, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The growth of traffic in the United States is one of the wonders of the world, and the courage with which railroad managers and capitalists have met the physical requirements of the situation is no less remarkable. There seems to be no end to the outlay. Many lines have been practically rebuilt, or are in the process of rebuilding, through straightening of line and reduction of grade. The renewal of structures is going on with new masonry, new bridges and heavier rails, with a view of carrying locomotive, car and train loads fully double what was thought necessary less than half a generation ago.

All these changes have been brought about through a high development of technical skill and scientific attainment, coupled with a rapid increase of financial resources. But while the solidity of the permanent works makes for economical maintenance, the track charges have not been brought down to that refinement made possible by improvement in the manufacture of rails and in the form of the common angle-bar joint now in use, and it is astonishing how large a sum can be figured up as potentially possible in this direction.

The rail joint is the weak point in the American railroad track to-day. No track in which the joint does not produce practical rail continuity, through equivalent strength, can be considered first class and economical from a scientific standpoint.

When one realizes that 50 per cent. of the track labor is concentrated at the joints, owing to the standard angle bar splice affording only one-third the strength of the heavy rail sections required by modern wheel loads, the possibility of reducing that labor to the average required by the body of the rail, would seem to be a maintenance prize worth contending for.

Again, with present joints, rail renewals (amounting to some 8 per cent. of total maintenance of way expenses) are more often compelled by battered ends than by failure in the body of the rail; these expenses a joint of equal rail strength would cut in two.

With a properly devised joint thorough spiking against lateral displacement could be secured, and we should have fewer accidents from spreading rails.

These facts are well known to maintenance of way engineers, and if only supported by managerial authority they would soon select a joint which would develop the full strength of their rails, and bring their track up to uniform strength. It is true that such a joint must, necessarily, cost more than the ordinary angle-bar, but that extra cost would so soon be "lost in the record" that it is not worth considering. To use a rail joint, which is only one-third of the rail strength, on the plea of first cost economy, is about as sensible as to make a chain with every tenth link or so one-third as strong as the links they connect, to save a little metal, ignoring the fact that the light links determine the strength of the chain.

A. P. BOLLER.

Four-Cylinder Balanced Compound Locomotives.

Hanover, Germany, March 11, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The description of the Baldwin four-cylinder balanced compound locomotive, for the Plant System, given in your issue of Feb. 28, page 139, has much interest for me, because I have made a good deal of investigation in the direction this design has taken. Mr. Vaulain's design is certainly a good one and will fulfil the purpose of balancing; it resembles my system,* as already described in your valuable paper, more than it resembles Mr. De Glehn's design.

In Mr. De Glehn's system each pair of pistons drives a

*The first description was published in the *Organ für die Fortschritte des Eisenbahnwesens*, page 141, 1897.

separate axle, for the purpose of dividing the power. In my system all four pistons drive the same axle, for the purpose of balancing the forces of pistons and reciprocating parts as perfectly as possible, and thus avoiding strains on boxes and frames. That is the principal difference in the two systems.

The results obtained from our locomotive which was exhibited at Paris, and a full description of which was given in the *Organ für die Fortschritte des Eisenbahnwesens* in 1901, page 208, and 1902, page 11, have fulfilled my expectations. After having run 40,000 miles in heavy express service there was no "pounding" or noise at all, and the locomotive still ran as smoothly as a passenger coach.

The diameter of bearings of driving-boxes was found to be the same as that of the driving axles; that is, they were practically as true in the fit as at first; whereas other locomotives, in the same service, used to show from 1/2 to 1 millimeter excess diameter in the boxes after running from 20,000 to 30,000 miles. The latter condition was accompanied by bad pounding.

In the arrangement of cylinders and front ends of frames also, my locomotive is quite similar to Mr. Vaulain's, except that I use two valves on each side to get different cut-offs on both cylinders, thus effecting better use of steam. By this means we run with a cut-off of from 0.3 to 0.4 in the high-pressure cylinders regularly.

Ten more locomotives, in general like those previously used, and three Atlantic type locomotives, are now being built to this system of compounding, for the Prussian State Railroads. They will have to compete with a similar number of De Glehn locomotives provided with superheated steam.

A. VON BORRIES.

Concerning Chances of Fire from Locomotive Sparks.*

VI.

The composition of sparks varies from that of ash such as results from the complete combustion of fuel, to that of fuel but slightly charred. Ash-sparks are incapable of carrying fire, but sparks composed of partially burned fuel may appear as small coals of coke which glow in the dark, or as incandescent or even flaming particles. It is noteworthy that incandescent or flaming sparks constitute but a small proportion of all the solid matter ejected. It appears, also, that those particles which are composed of combustible material and which are, therefore, capable of carrying fire are, except in rare instances, deprived of fire by violent contact with the mechanism of the front-end against which they are driven, and by gathering moisture from the stream of exhaust-steam which serves to send them out into the atmosphere. In the vernacular of the road, they are "killed."

The size of sparks, as estimated from appearances about the stack, is often deceptive. Incandescent particles emitted, especially at night, appear large, when in reality they are very small. An investigation of the front-end mechanism, through which all sparks must pass before they can reach the outer air, will generally show that it is impossible for sparks larger than a half-kernel of corn to be emitted.

The fact has been mentioned that but few of all the sparks delivered carry fire, and many of these are doubtless small in size. The experiments in gathering sparks from passing locomotives, the results of which are recorded in a preceding chapter, failed to disclose a single instance in which a falling spark sufficed to scorch common, unbleached cotton muslin which was laid in the bottom of the collecting-pans to receive them. These observations were made in the months of April and May. It is the testimony of many experienced railway men that atmospheric conditions have much to do with the fire-carrying properties of sparks; that in winter, when the air and all combustible material upon which sparks may fall are cold, fires from sparks never occur; that it is only in midsummer, when the temperature of the atmosphere is high, and when long-continued dry weather has prepared the grass of the roadside for a fire, and a hot sun has warmed it to a high temperature, that fires from sparks are, under normal conditions, possible. So small is the heat-carrying power of a spark from a locomotive in good order that it may be doubted whether such a spark was ever the means of communicating fire to the roof of a building, even when under the influence of a summer sun the roof had become well dried and highly heated, except in cases where it may have fallen on materials more finely divided than shingles.

The distance traversed by sparks, as shown by observations along the track, establishes the danger-line very close to the track. Both a large percentage of all sparks thrown out and the largest individual specimens were found, in the experiments herein recorded, within a distance of 100 ft. from the center of the track. This distance fixes the danger-line.

Finally, as tending to confirm still further the conclusions already stated, it appears that, if, in his efforts to show that sparks travel long distances from the track, one abandons all consideration of local conditions, and bases an estimate on the physical laws governing the movement of all bodies in air, he will be obliged to assume that sparks rise to a very great height, or that they are influenced by a very strong wind, before his results will prove that sparks are carried very far afield. In other words, it may readily be shown by the well-known laws

*Concluding abstract from advance sheets of a book now in press entitled "Locomotive Sparks," by W. F. M. Goss. To be issued by John Wiley & Sons, 43 East Nineteenth street, New York. See the *Railroad Gazette*, Feb. 28, March 7, 14, 21 and April 4.

applying to falling bodies that sparks sufficiently large to carry fire must, under ordinary conditions of discharge and of wind velocity, strike the ground within comparatively short distances from the track. . . .

While an effort has been made to fix the maximum distance over which sparks will travel, it does not follow that all sparks cover this distance. They are often prevented from doing so by eddies which form in the currents of air about the train. Thus a moving train is surrounded by a zone of air which partakes more or less completely of the motion of the train itself, depending upon the thickness of the enveloping film which one chooses to consider, and upon the part of the train to which it is assumed to apply. The head of the moving train entering undisturbed air creates strong lines of pressure which wrap themselves in wave-like form about its initial end and are carried along by it. At the rear of the moving train the atmospheric pressure is less than normal, and the air rushes in from all sides in strong currents to fill the space left by the receding train. The effect of eddies thus formed, upon the course of sparks discharged by the locomotive at the head of the train, is a subject which probably has not been carefully studied. There is, however, much to sustain the theory that such sparks do not escape the influence of the eddies, but that they are caught up by them, held within their influence, and finally drawn into the zone of low pressure at the rear of the train. In so far as this argument applies it serves to show that sparks which would otherwise be carried by the wind at right angles to the track are in reality carried along with the strong currents of air which move with the train until they settle upon the track at its rear. An observer at the rear of a rapidly moving train cannot but be impressed by the vigor of the air-currents which are drawn in upon the track in its rear, and which reach out to objects far distant from the track itself and influence their motion. The smoke from a locomotive at the head of a rapidly moving train trails close on the top of the train and drops as it passes over the last car, regardless of the direction or velocity of the wind. . . .

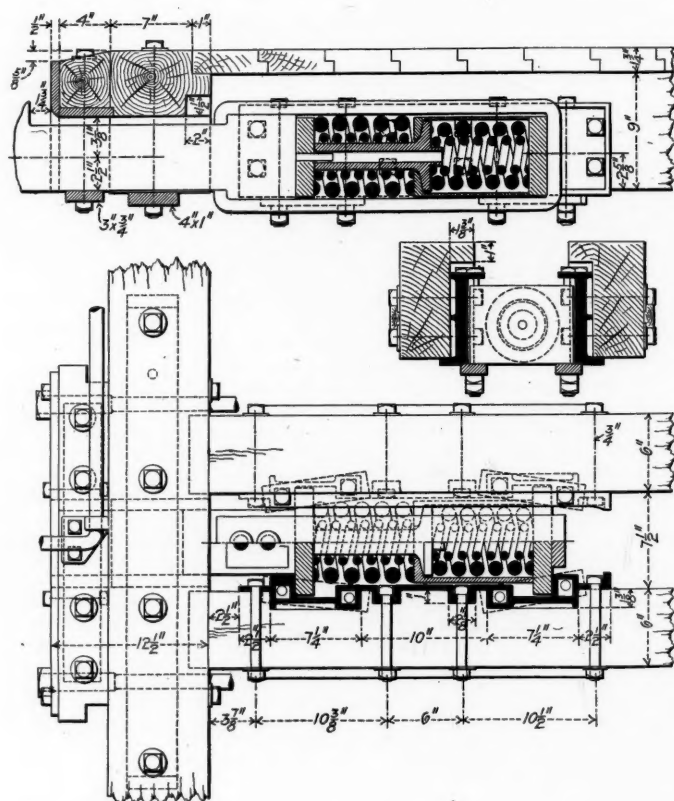
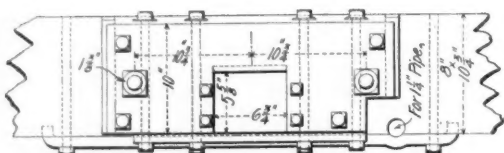
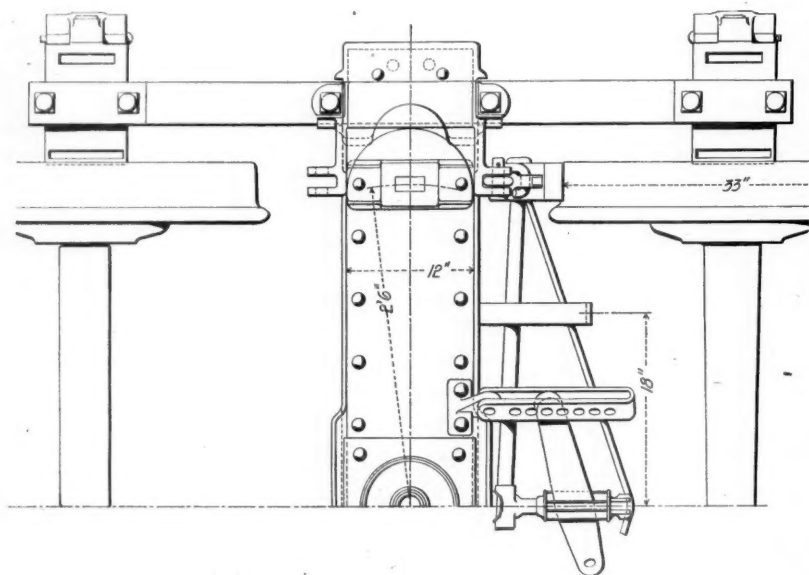
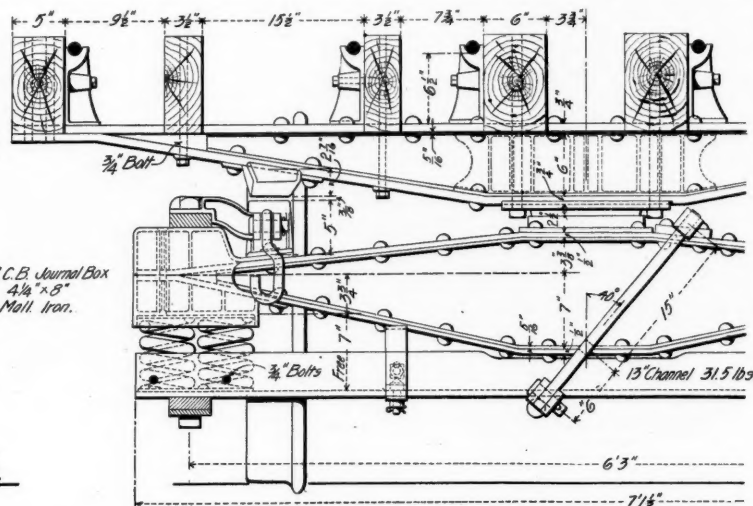
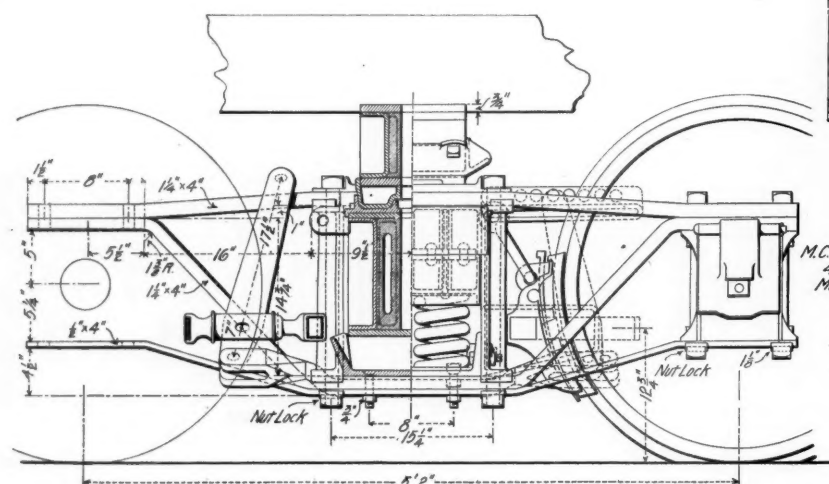
It is a matter of common knowledge that sparks and

sometimes brands arising from a fixed fire are carried by the wind over long distances. Fragments arising from a burning building, for example, are not infrequently carried a half mile or more. The question at once suggests itself as to why it is that brands from a burning building will travel such distances, while sparks from a locomotive are borne but a few feet. The answer is to be found in the different conditions which prevail in the two cases. Thus the shape of many of the fragments arising from a burning building well fits them for sailing in the air. When such a fragment, as for example, a shingle, is blazing, it carries with it its own sustaining power. The heat from the flame stimulates ascending currents of air which, acting upon the broad surface of the fragment, tend to keep it in air while the wind bears it away. Again, a fixed fire serves to establish strong and far-reaching air-currents. If the wind is light, the column of heated air rises as the fire proceeds to greater and greater heights, the activity of the upward current becomes intensely strong, and particles which are caught within its influence are borne to very great heights. When these are of the sort which have been described, they settle very slowly after being released from the influence of the upward current, and drift away with the wind. If a large fixed fire occurs in the presence of a strong wind, the heated current constitutes a vast lane moving obliquely upward, reaching out over territory miles distant from the source of heat, bearing fragments and burning brands. In either case the power of the fixed fire in spreading sparks and brands lies in the fact that the heat developed in any one moment is supplemented by that which is developed the next moment. The currents of air which are set in motion by the heat developed during any one period are accelerated by the heat of a later period. The whole process is cumulative, and, other things being the same, the larger the fire the more rapid the currents become and the farther they extend their influence.

thus not easily borne by ascending air-currents. They are so small that, while they give up the heat they carry very rapidly, the amount liberated is insufficient to stimulate to any marked degree upward currents of air about them. Again, the total amount of heat liberated from a locomotive is small compared with that generated by a burning building and, hence, all effects are less pronounced. As sparks go out of the locomotive stack, they find no far-reaching current to carry them on, for each exhaust from the stack is into undisturbed air. There is absolutely no cumulative effect. The heat-energy delivered is dissipated in the atmosphere which canopies the whole length of track, the discharge of a single minute being perhaps distributed over a mile of territory. There is, therefore, nothing to buoy up the locomotive spark but the initial velocity with which it is projected. From these considerations it should be evident that conclusions based on observations in connection with fixed fires are not applicable to the conditions affecting sparks in locomotive service.

**Standard 60,000 lbs. Capacity Box Cars for the Central
of New Jersey.**

The American Car & Foundry Co. is building 1,000 box cars, at the Detroit shops, for the Central Railroad of New Jersey, as we recently noted, and the design is here shown. American Railway Association standard dimensions govern the design, and, aside from that, the specifications for the general design of the Central of New Jersey's old standard 60,000 lbs. capacity box car have been followed. The truck, which is also shown, has practically been standard for cars of this capacity for several years on this railroad, and having given service satisfactory enough to warrant its use on this big up-to-date order, it is entitled to some consideration. It brings these cars within the classification of "box cars on low trucks," as considered in the recommendations of the Master Car Builders' Association committee, appointed to establish outside dimensions for the standard box car, based on



Truck and Draft Gear for Standard 60,000 lbs. Capacity Box Car—Central Railroad of New Jersey.

the clear inside dimensions of 36 ft. long x 8 ft. 6 in. wide x 8 ft. high, American Railway Association standard.

It will probably not be amiss to recall that the Master Car Builders' Association committee recommended that for box cars on low trucks, where the distance from the top of the rail to the top of the floor of the car is 3 ft. 6 in., the upper edges of the eaves should be 12 ft., $\frac{3}{4}$ in. above the rail, and that the maximum width at the eaves at this height should be 9 ft. 10 in. Also that the committee made no recommendations for exterior longitudinal dimensions, but was of opinion that the strongest end construction should be used regardless of longitudinal dimensions over all. In all of these things the Central of New Jersey cars are interesting. First, in illustrating how readily older specifications can be adapted to further the present strong movement toward standardization; and again, in the close compliance with the interior standards of the American Railway Association, joined to the recommended standard exterior height and width, of the Master Car Builders' Association committee.

The height of these cars from the top of rail to the upper edge of the eaves is 12 ft. 1 in., and the width of eaves at that point is 9 ft. 9 in. As against 12 ft., $\frac{3}{4}$ in., and 9 ft. 10 in., respectively, recommended, these dimensions, with the floor height of 3 ft. 7 $\frac{1}{4}$ in. from top of rail to top of floor, practically put the design in exact

there is no limit to the tickets sold. Those who can't get inside have to stand on the platform, and in this weather no wonder that many of them freeze."

The Cuban Railroad Law.

General Wood, Military Governor of Cuba, has issued a new code of laws for the government and regulation of the railroads of the Island, and it has been printed in a pamphlet containing the whole both in English and Spanish. Following is a condensed abstract of the main features of the code.

The latest edition of the pamphlet contains the rules of practice before the railroad commission, forms of documents to be used by complainants, and the official classification of freight.

ABSTRACT OF THE RAILROAD LAW OF THE ISLAND OF CUBA AS REVISED FEBRUARY, 1902.

Carriers Subject to the Law.—The law applies to all railroads both public and private.

The Railroad Commission.—This Commission is composed of the Secretary of Public Works, (Chairman); the Secretary of Agriculture, Commerce and Industries; and the Secretary of Finance. The first attends to technical matters, the second to questions of tariffs and by-

Provisional Surveys may be made under the direction of the Commission, but a grant to one company does not prevent another from obtaining a similar permit.

Organization.—Five or more persons may form a corporation. The articles of incorporation shall state capital, number of shares, business, terminal points, etc. This chapter refers especially to liability of stockholders, issue of stock and duties of directors so as to fully protect investors and the public in the premises.

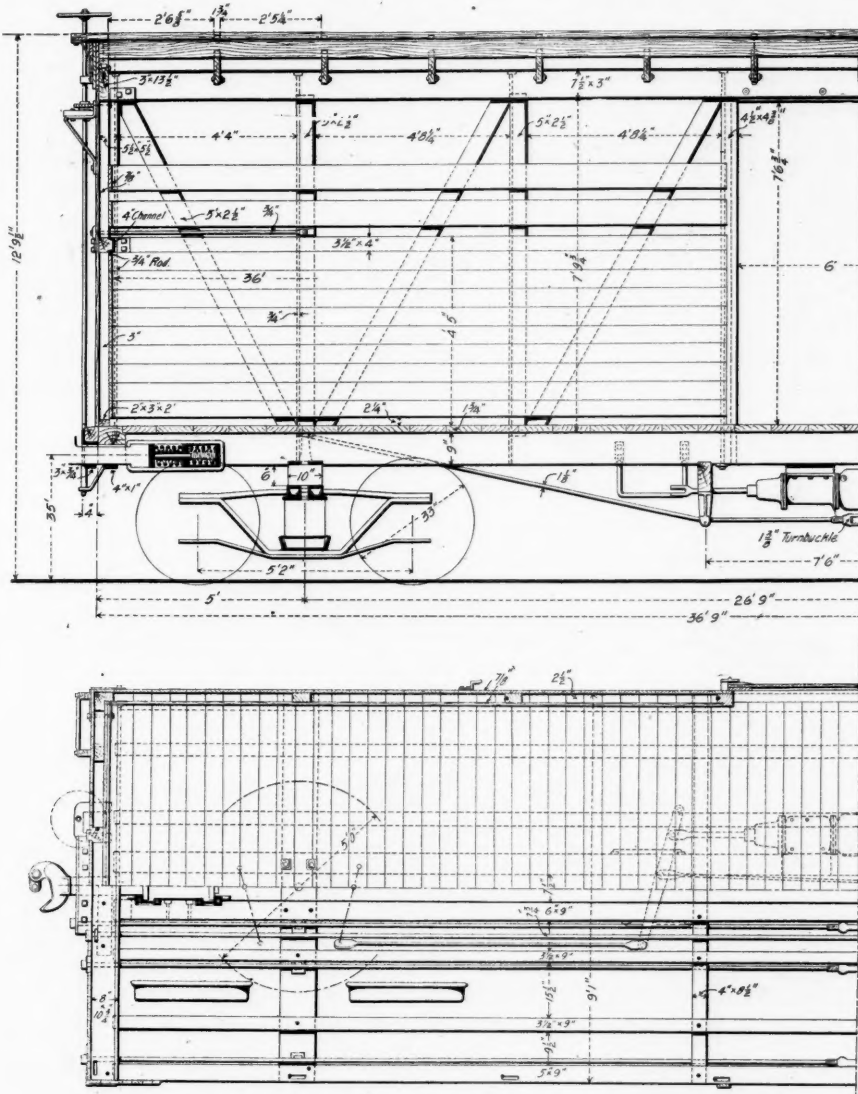
Powers of Railroad Corporations.—Railroad corporations shall have power to occupy the public domain, under certain conditions; have succession; sue and be sued; acquire property, etc., and consolidate with other railroads.

Administration of Railroad Corporations.—This chapter relates to the management of the financial affairs of the railroad. The directors are not permitted to make dividends except from the surplus income arising from the business.

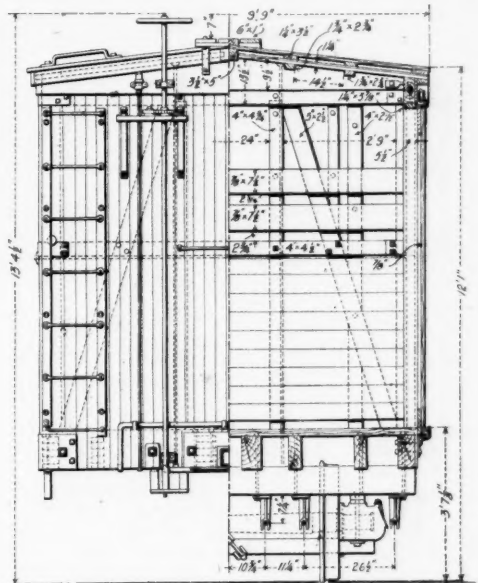
Expropriation.—The Commission fixes the manner and time of entering on any part of the public domain, and determines the approximate value of property taken.

Mortgages and Sales.—Mortgages may be made to secure bonds. Provision is made for foreclosure upon default by judicial proceedings.

Construction of Railroads.—The map of a proposed road shall first be submitted to and approved by the Commission. The health and safety of employees during con-



60,000 lbs. Capacity Box Car—Central Railroad of New Jersey.



Half End Elevation and Section.

struction shall be protected. The right of way is 30 meters in width, and the standard gauge is 1.433 meters (4 ft. 8 $\frac{1}{2}$ in.) The law provides for careful and prompt construction, and for inspectors' approval.

Railroads for Private Use.—Private roads may be incorporated for the use of a plantation or specified industry. With approval of the Commission they may occupy the public domain. But they shall not have other powers granted to public railroads. If they have standard gauge and heavy rails they may be changed into public roads upon petition to and order of the Commission.

Maintenance and Operation of Railroads.—Railroads shall issue time-cards of arrival and departure of trains, provide for the redemption of the unused portion of tickets, and afford equal facilities of traffic to intersecting lines. Fifty kilograms (110 lbs.) of baggage are allowed on first-class tickets, and 30 kilograms (66 lbs.) on lower class tickets; company's liability for loss or damage not to exceed \$100. Railroads may carry express matter or lease its conveyances to express companies, but such contracts shall not be exclusive.

Provision is made for best modern safety and other appliances on trains and for comfortable accommodation for passengers. Railroads may furnish parlor, drawing-room or sleeping cars and charge extra compensation therefor, or let out such business to another corporation. Employees shall wear badges and conductors shall exercise powers of the police force. Baggage checks are provided for.

Reasonable regulations shall be enforced as to dangerous explosives and perishable goods, and for sale of freight or baggage uncalled for at stations for six months. The railroads are required to carry the mails of the Island under direction of the Postmaster-General.

Uniform Freight Classification.—The Railroad Commission is to establish a uniform classification, which cannot be changed within two years except upon complaint and hearing.

Maximum Rates.—The classification being established the railroad companies are to present to the Commission tariffs of maximum rates, which the Commission has power to alter or amend after hearing. These maximum rates cannot be changed within two years, but, upon complaint to the Commission of unreasonable and unjust rates actually charged by the railroad companies, the Commission may, after full hearing, order the rates to be corrected as the facts seem to require.

Whenever wrongful prejudice or disadvantage shall appear to result from comparison of rates or tolls charged by one or more railroad companies the Railroad Com-

conformity with the joint recommendations of the two associations.

The length over end sills is 36 ft. 9 in., the distance between truck centers is 26 ft. 9 in., and the wheel-base of truck 5 ft. 2 in., the truck centers being 5 ft. back of the outer face of end sills. The height from top of rail to top of foot-board is 12 ft. 9 $\frac{1}{2}$ in., and from top of rail to top of brake-staff is 13 ft. 4 $\frac{1}{2}$ in. Other dimensions, and the details of construction are given in the illustrations.

These cars will have the Chicago roof, Common Sense body and truck bolsters, National Malleable Castings Co.'s journal boxes, Magnus Metal journal bearings, Railway Car Spring Co.'s draft and bolster springs, Williamson and Pries draft rigging, Kewanee and Sterlingworth brake-beams, Carnegie steel axles, Dunham side door fittings, and Smillie couplers.

In farthest Siberia, even in Vladivostok itself, it is to be feared that the press is prejudiced against the railroads, finding fault with little things like this: "It is a lucky day when the train comes in with only four frozen Chinamen; sometimes there are eight of them. On one section of the road the train has but one car for passengers, and that a stock car fitted up with benches; but

laws, and the third to matters connected with the public domain, private land and taxation.

The Commission appoints a secretary, an inspector-general, and an accountant. The Commission has power to hear and determine complaints involving right of way, physical condition, grades, crossings, location, use of tracks, navigable rivers, construction, adjustment of rates and fares, traffic arrangements, unjust discriminations, eminent domain, interpretation of by-laws, rights and obligations under concessions, and compliance with charter provisions.

The Commission may enter upon railroad property, inspect the physical condition, regulate speed, compel production of books, papers and documents, issue subpoenas, approve, modify or reject regulations made by railroads, fix maximum rates, and make a uniform freight classification, which the carriers must publish, prescribe form of carriers' reports, investigate accidents, direct repairs to be made, order compliance with its orders after due hearing, and make annual reports of its acts.

The total annual expense of the Commission shall not exceed \$25,000, and shall be borne by the railroads. The Commission and its employees shall be transported over the railroads free of charge while discharging their official duties. Appeals from the Commission's orders may be taken to the Supreme Court.

mission has authority to order an increase of the lower rate or a reduction of the higher rate, or both, as the circumstances may require.

General Restrictions.—All rates shall be published, and no rebate or secret rate is lawful. All tolls shall always under the same circumstances be charged equally to all persons. No unjust discrimination in rates under like conditions shall be made between different localities. In justifiable cases of competition or for other causes the Commission shall have power to authorize specially in each case temporary exceptions to the general conditions of the application of rates. No unreasonable rate shall be charged and no undue preference or advantage given. Upon complaint the Commission may order a given rate discontinued and substitute another.

Appeals.—The decisions of the Commission are decisions of the Government, but appeals are allowed to the Supreme Court, which shall review upon the facts as well as upon the law. All appeals must be taken within 30 days.

Orders of the Commission upon complaints of unlawful rates or practices are only binding upon the companies for six months, but such orders may be re-issued from time to time after due hearing, with, however, the same right of appeal to the Supreme Court.

Safety of Public and Employees.—All accidents resulting in loss of life or injuries to persons must be immediately reported to the Commission. The health and safety of employees and the security and convenience of the public are provided for. The Commission is to investigate all matters relative to safety and the cause of accidents.

Appeals and Limitations to Actions.—Actions for injuries must be brought within six months. Appeals to the Supreme Court shall be taken within 30 days.

Collection of Debts.—The operation of a railroad shall not be interrupted by Government unless dangerous to the public. In cases where creditors unsecured by mortgage shall have obtained judgments, the judge can appoint a receiver to take immediate possession of the railroad. Public sales can be had only in case of default of payment of mortgage debts.

Criminal Law.—Any one wrecking or attempting to wreck a train with intent to injure or to endanger life is liable to imprisonment for life; if he does cause the disaster and death ensues, the penalty is death. Stopping a train for purposes of robbery, etc., is punishable by imprisonment for life or for any term not less than 20 years; or if death result the penalty shall be death. Stealing, interruption of free use of a railroad, riding without paying fare, and other similar acts are made punishable by appropriate penalties.

Railroad Employees and Their Representatives Recognized.—The Commission is to revise and approve the by-laws and working regulations of railroad companies, and all such regulations pertaining to and affecting employees are to be approved only after the aforesaid employees or their representatives have had opportunity to be heard before the Commission.

An Automatic Nut-Tapper and A Bolt-Threading Machine.

The accompanying illustrations show two valuable machine tools made by the Acme Machinery Co., Cleveland, Ohio. Figure 1, shows in half-tone and line drawings, an automatic double bolt threader, the bed of which is made in box form and encloses the principal parts of the machine. The feeding device being on the outside of the box bed, makes it easy of access, and the working parts are protected from contact with oil used in threading the bolts, and thus are saved deterioration from grit, which otherwise would be thrown on them. The threading is done by two vertical gear driven spindles which are guided by lead-screws running in split nuts at their lower ends. When the machine is running in the direction which sends the threading spindles upward, the die-heads on these spindles are threading the bolts, and when the belt shifts and the machine reverses, the speed is doubled while the dies run back. This complete operation threads two bolts.

The spindles are of tool steel carefully made, the bearings are hardened and ground tool steel, and the lead screw and split nuts are also of tool steel. All gears are cut from the solid and all bearings are either of tool steel or bronze. Bolts are put in the hopper at the top of the machine and the machine automatically arranges them in two runways, one on each side of the machine, where they hang by their heads and are fed to the machine by the mechanism shown. If a ragged bolt or piece of scrap gets in the way, the feeding mechanism is automatically thrown out of gear. There is also an automatic relief for the machine, in case a crooked bolt is fed, in which case the split nuts on the lead-screw, which are held in position by spring pressure only, begin to travel downward as soon as the obstruction is reached by the die-head. The further construction and operation of the machine is apparent from the illustrations.

Figure 2 shows in half-tone illustrations and line drawings the Acme Nut-Tapper. A slight discrepancy in the nut chute, as shown in the half-tone, and in the line drawing may be noted. In the drawing the nut chute delivers the nuts to the pushers in such a way that the column of nuts stands in the same plane as the nut pushers, while in the half-tone the nut chute is shown curved. With this difference noted, the line drawings show the construction correctly, except for

some minor changes which are immaterial, and the half-tone shows the machine in its latest development.

The bed of this machine is also made in box form. The principal working parts are enclosed and the feeding mechanism is outside of the box bed for easy access, as in the case of the bolt cutter. The material and workmanship of this machine are the same as on the bolt cutter, in so far as the use of hardened steel and bronze are concerned. There are four vertical spindles gear-driven and the taps work upward into the nuts. The withdrawing speed is double that of the tapping speed and one cycle of the operation of the machine taps four nuts.

Nuts are placed in the circular receptacle at the top of the machine in a series of cells into which the top is divided as by the spokes of a wheel, and the bottom of the receptacle has one opening in it, the size of one

affect the main plan and purpose of the bill. Some changes of local interest concerning streets to be left open or closed have been made; new roundhouses and shops for the B. & O. R. R. are provided for in Eckington; the location of the tunnel under Capitol Hill to enable the passenger trains of the Southern roads to reach the station has been shifted 37 ft. to the west in order to still further avoid any risk of danger to the building of the Library of Congress, and some larger plate girder bridges are provided for over streets in connection with the track elevation.

The bill and report provide in great detail for the joint construction of the line and terminals by the B. & P. R. R. and the Terminal Co., and detailed estimates of the entire cost, including damages to property from the change of grade, are submitted. The station building is to be 760 ft. wide, the width being greater than the length



Fig. 1.—The Acme Automatic Bolt Threader.

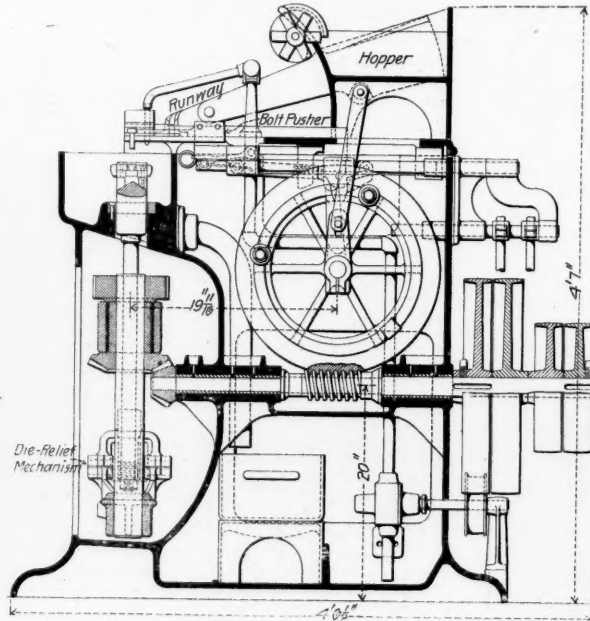
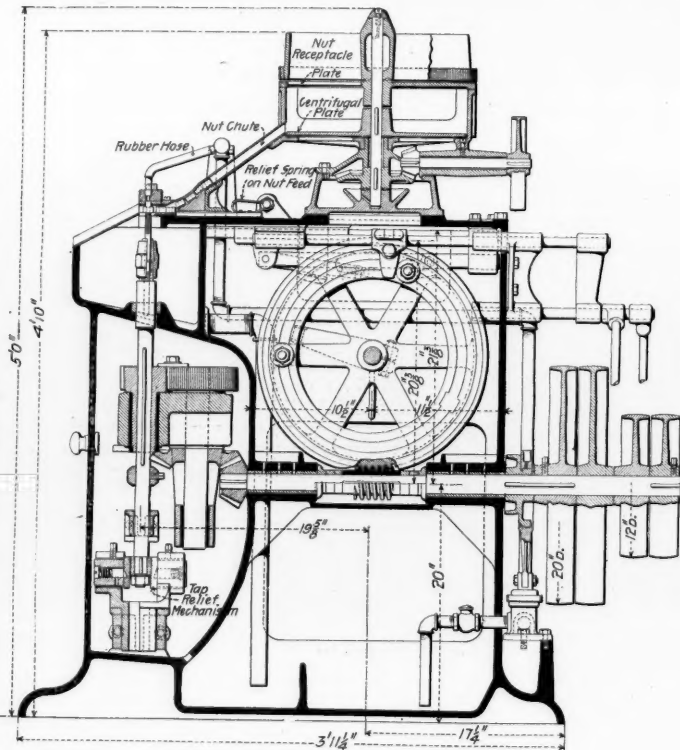


Fig. 2.—The Acme Automatic Nut Tapper.



cell. By revolving the receptacle, one cell-full of nuts is discharged on the revolving plate below at regular intervals. The centrifugal force of the revolving plate delivers the nuts into the four chutes that lead to the taps. This machine also relieves itself automatically in case of obstruction. The nut-feed relief and the tap relief are both automatic and when the obstruction has passed, the machine automatically resumes proper relations for tapping.

Mr. J. H. Haskins, of the McCormick Harvesting Machine Co., Chicago, is the inventor of these machines, and there are 75 of the machines in use at those works.

Union Station at Washington.

The bill providing for a new union passenger station and terminals at Washington, on which a favorable preliminary report was made to the United States Senate on April 3 by the Committee on the District of Columbia, contains some changes from the project as outlined in the *Railroad Gazette* of January 17, but no amendments that

of the Capitol. It is to be built of white marble with the interior of masonry in the classical style of architecture. It will be entered from a vestibule 293 ft. wide containing three arches, and there will be a private entrance for the President of the United States and for ceremonial occasions. The waiting room will be 130 ft. x 250 ft. with masonry walls and a roof of iron and glass. A lobby 80 ft. x 550 ft., and the other usual rooms are provided for and ample facilities both in the station and on the front and side streets adjoining, are provided for the convenient handling of large bodies of troops and other large crowds. The station is arranged for 29 tracks, with room for seven additional tracks to provide for future growth. The minimum cost of the station building has been placed at \$4,000,000 but the total actual cost will be nearer \$5,000,000.

The entire cost to the railroads of the changes proposed, including the elimination of grade crossings and the new station and terminals, amounts to \$6,761,651 for the B. & P. R. R., and \$5,599,408 for the B. & O. R. R., or a total of \$12,361,059, in addition to which the District

of Columbia and the United States will spend on streets and avenues \$1,670,000, making the grand total to be spent over \$14,000,000. Of this amount the District of Columbia and the United States also pay \$1,500,000 to the B. & O. toward the elimination of grade crossings along its line, and the United States pays \$1,500,000 for the lands in the mall now used by the B. & P. R. R. Various other small items are also provided for which do not materially affect the above statement.

Water-Tube Locomotive Boilers on the London & South Western Railway.

In the *Railroad Gazette* of Dec. 27, 1901, we gave a short note about a water-tube locomotive boiler which Mr. D. Drummond, Locomotive Superintendent of the London & South Western Railway, had designed. The half-tone illustrations, which we now give, are reproduced from *The Engineer* (London), Dec. 13, 1901, and the line drawing of the boiler was sent to us by Mr. Drummond.

It will be seen from the illustrations that the usual form of fire-box is used, and that in it there are a number of cross water-tubes; that within the large cylindrical flue also, there are a number of cross water-tubes, and at both sides of the cylindrical flue there are a number of smaller flues used as in the ordinary tubular boiler. Mr. Drummond says that the London & South Western has now 100 engines with boilers fitted with cross water-tubes; that up to the present time there has been no complaint, and that it has not been necessary to do any repair work on the tubes during the last two years.

The engines fitted with cross water-tubes are said

to be much more economical than engines having the ordinary boiler, and all locomotive boilers of the London & South Western are now being fitted with cross water tubes.

The boiler shown in the drawing sent by Mr. Drummond, which we have here reproduced, has been working about three months. The total heating surface is 742 sq. ft., and the locomotive on which it was placed is running in the same "link" with locomotives having ordinary flue tubes and a total heating surface of 1,291 sq. ft. It is apparent from these totals of heating surface that the locomotive having the cross water tubes is smaller than the locomotives among which it is working, and Mr. Drummond informs us that it is doing the same work as these locomotives and is saving on an average 1 lb. of coal per mile as compared with the locomotives having flue tubes.

The boiler drawing shows the different angles at which the water-tubes are placed in relation to the horizontal, and also indicates the provision for inspecting and cleaning the water-tubes in the fire-box. In this boiler one door is placed in the outer shell on each side of the fire-box as shown in the dotted lines. The total heating surface and its apportionment are listed on the drawing.

At least two American designers have latterly been at work on water-tube arrangements for locomotive boilers, and we shall soon publish the design submitted by one of them, showing an interesting and radically different idea from that of Mr. Drummond. This American designer has worked out his conception to suit Prairie type passenger and consolidation freight locomotives, both of which will be illustrated.

The Ingoldsby 100,000 lbs. Capacity Wooden Dump Car.

Last week we gave results of heavy running tests of the improved Ingoldsby wooden dump car of 100,000 lbs. capacity; also a picture of the car. The improvements of the new cars for the Colorado & Wyoming, as distinguished from the features of dump cars previously built by the Ingoldsby Automatic Car Co., are as follows: A greatly simplified arrangement for raising the doors back into place. Provision for allowing one door to be operated independently of the others. Provision against lodgment of material on the inside edges of the doors when the cars are being used as side dumpers. An improved false top which is easily and quickly removable in sections, thus lowering the sides of the car to facilitate loading or unloading by hand, as in the transportation of brick or similar commodities which must be handled carefully to avoid breakage; or for steam-shovel work in restricted quarters, for unloading coal by shoveling at points not equipped with dumping trestles, or for any service which calls for a car with low sides.

This removable false top consists of short boards fitting into grooves in the malleable iron false top castings, and all that is necessary to remove a section is to take out the cotter pins, which securely lock the boards to the castings, and then lift the boards out of their grooves. The sections are about 5 ft. long, and the removal of one or more sections does not disturb the balance of the false top. This gives economy of time and labor in such service as above mentioned.

The new door raising arrangement, which makes it easy to operate one or more doors independently of the others, is of great advantage where it becomes necessary to unload the material into short bins, as even one-fourth of the load can be discharged without disturbing the balance of the contents in the car. A report recently received from a railroad testing this equipment says, in part: "We tested the car with coke, and unloaded in one minute and fifty seconds, including one movement of the car, necessitated by only being able to drop one-half of the load at a time. This was due to our bins being too short to allow dumping the full load at one time."

The general dimensions of the Colorado & Wyoming cars, illustrated last week, are as follows:

Height from top of rail to top of car body proper . . . 8 ft. 4 in.
Width over all . . . 10 ft. 0 in.
Length over end sills . . . 41 ft. 9 in.
Height of false top . . . 20 in.
Weight of car . . . 39,400 lbs.
Coal carrying capacity . . . 110,000 lbs.
*Ingoldsby recommended practice is to have the false top 16 in. high.

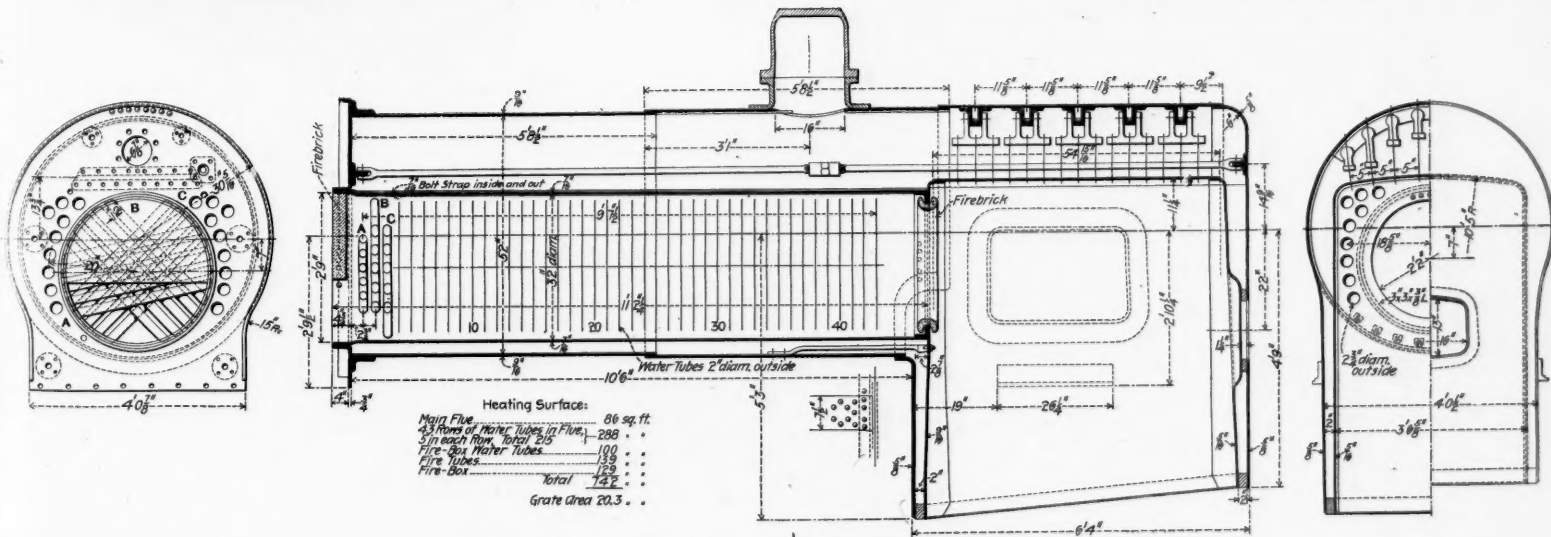
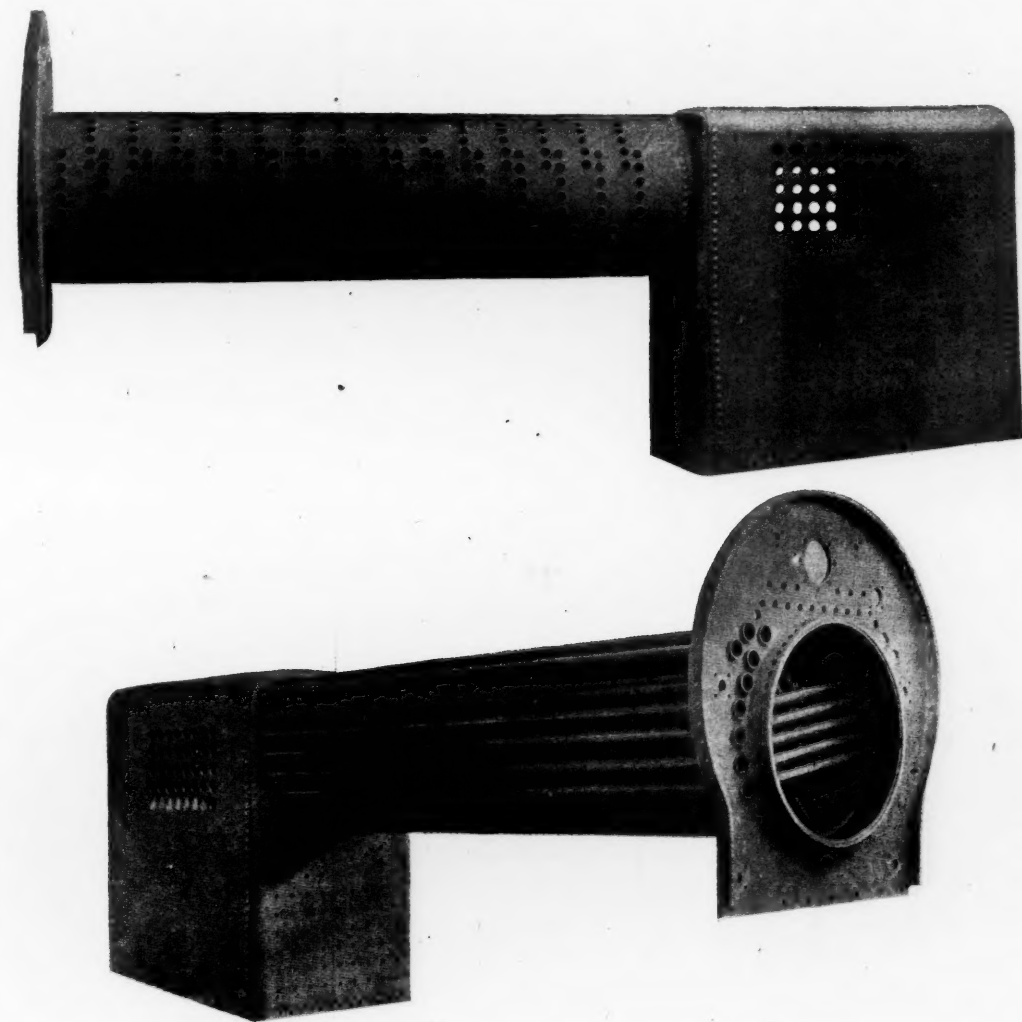
Electric Drive in the Omaha and Pocahontas Shops.

Two important contracts for electrical apparatus for railroad shops have been secured lately by Westinghouse, Church, Kerr & Co., including complete generating plants as well as motor equipments. This apparatus will be installed in the new shops of the Union Pacific at Omaha, and the Oregon Short Line at Pocahontas, and will consist of Westinghouse machines throughout—engines, generators and motors. It is proposed to adopt direct driven tools wherever possible.

The equipment for the new shops at Omaha will contain two compound engines directly connected to 250 kilowatt 250 volt engine-type generators and one compound engine directly connected to a 75 kilowatt 250 volt generator. These engines are to run non-condensing under a boiler pressure of 150 lbs. The contract also covers 21 shop motors of various sizes from 5 to 25 h.p.

The Oregon Short Line contract covers two standard engine-type outfits for direct connection to 150 kilowatt 250 volt generators, and one Junior engine for direct connection to one 50 kilowatt 250 volt generator, the engines to be of the regular Westinghouse construction with bed-plates. The contract also covers 12 shop motors of various sizes. These engines will operate non-condensing under a boiler pressure of 100 lbs.

The Union Pacific and Short Line Companies will use Westinghouse motors for all individual direct driven tools.



Drummond's Water-Tube Locomotive Boiler—London & South Western.

This means 21 motors for Omaha ranging from 5 h.p. to 25 h.p., and 12 motors for Pocahontas ranging from 5 h.p. to 25 h.p.

Railroad Organization.*

It will be said of one railroad that it has no organization, and it will be said of another that it has a perfect organization. No extreme statement of this kind can be true. No railroad of any size could do business without some definition of the duties of its officers and employees, and although we can approach perfection in railroad organization, as in anything else, it is, of course, impossible for us to attain it. I was once told by an officer of a certain railroad that its organization was so complete that it made little difference who filled the individual positions. After a careful observation of this railroad for a number of years, I came to the conclusion that he was utterly mistaken, that the personnel of this railroad was fully as important as the organization, and that the organization had to be adapted to circumstances and to personnel on this railroad as well as on all others. We must remember that in outlining an organization for any railroad, we are only dealing with present needs. It is the same thing as with standards. In making the organization or the standards for any railroad we do not deal with finalities, but every improvement that we make should simply be the basis for further improvement.

Bear in mind that there is a technical meaning in the word "organization." When a railroad prints its "organization" it usually defines the duties of its officers only. The duties of the employees are defined in the "Book of Rules," which exists on practically all railroads. But this paper endeavors to deal with organization in the wider sense from top to bottom of the railroad service.

If we had the time, it would be interesting to speculate, now that it is too late to inquire, as to the first experiments in railroad organization in this country. The records show that there were engineers in charge of the construction of the early railroads, very much as there are engineers now. On at least one railroad there was a superintendent from the beginning. We can read of the importation of the first locomotive, and of the first engineer, and we can imagine the engineer in charge, or the superintendent, as he hired his first fireman and his first trainmen; we can imagine after his first mishaps how he put on his first gang of trackmen, but some one must search in old diaries and letters for an account of what was done when the engineer in charge, or the superintendent, organized his departments to look after his track, his locomotives and his transportation; and later how he found necessity for departments of finance, accounting and traffic. The full result of this evolution has become fairly uniform on the smaller American railroads, and I will outline the usual organization of such a railroad one or two hundred miles long.

This railroad we may call, for lack of a better term, a one-division railroad, to distinguish it in its organization from the larger systems, which are each made up of several territorial divisions, and sometimes of grand divisions.

Of course our railroad will have a board of directors elected by the stockholders, and the chief executive will be the president. I say "of course" because we are dealing with American railroads; but in the rest of the world this is not a matter of course at all. On the English railroads many of the chiefs of departments report direct to the board of directors and there is no one man in such absolute control as is the president of an American railroad; even the chairman of the board has no such absolute power; but with us the chief executive is the president. To handle the money of the concern the president will have a treasurer, and to keep the accounts he will have an auditor. To secure the traffic and make the rates he will have a traffic manager, who may be called the general freight and passenger agent; and to run his railroad he will have a superintendent.

If you are fond of dividing subjects into triads, as are many people, you can epitomize this by saying that the president should have three departments, one of finance, one of traffic, and one of operation; but the difficulty with a separation of this kind is that it will not work out as regards the finance department. The experience of American railroads has shown that the treasurer and auditor must be entirely independent, so that it is really impossible for a railroad of any size to reduce the departments to a smaller number than four. You will notice that I have omitted the law department, which is a very important element at the general offices of the larger railroads, because on the smaller railroads the law business can very well be done by retaining the services of a lawyer who has other business as well. I must ask your especial attention to the fact that the traffic department and the operating department are completely separated on American railroads. In this they differ from English lines.

The treasurer of the company is responsible for the custody of all monies received, and when it is necessary to borrow or lend money, he attends to that. The regular receipts of the agents and any monies incident-

ally received by any other of the officers or employees of the railroad are promptly remitted to him. He pays out nothing except on vouchers signed by the auditor.

The auditor is responsible not only for the general accounts of the railroad, but the accounts of everybody else, including chiefly the agents. Whenever anyone on the railroad makes a remittance to the treasurer, he notifies the auditor, so that the auditor and treasurer are able to check up their accounts every day.

The traffic manager makes the rates and solicits the business. He is held responsible for earnings and indicates the sort of transportation that will pay. He largely represents the railroad with the public and with other railroads; indeed, the traffic man is the diplomat of the railroad service.

At this point in my paper, I was about to proceed in a most orthodox way with a description of the operating department, beginning with the heads of department, and running down through the line, when it occurred to me that the thing could be put more lucidly if we were to begin at the bottom and work up. It is the rank and file that do the work of the railroad, after all. I will begin then with the real railroaders, with most of whose duties you are familiar, and will construct an organization to keep them in line. The first railroad man that the public meets, is, of course, the agent, from whom he buys his ticket, or with whom he arranges for the movement of his freight. The passenger or the freight is loaded by the agent or his force in a car. Before the train goes, each car is inspected by a car inspector, who is a most important individual. His little chalk mark on its side will stop the proud progress of the fleetest of private cars. The car forms part of a train which is in the hands of an engineman, fireman and trainmen, a conductor and brakeman, sometimes with a baggageman and a flagman as well. Before the train can leave the station it will usually receive a signal or train order from an operator, and when it starts on its way, it will pass every few miles the trackmen, who are always at work at maintaining the way. Of course the railroad keeps its locomotives and cars in repair, and on every long journey you will see roundhouses and shops where the railroad's mechanics are working. Here you have them, the agents, operators and trainmen, the enginemen and firemen, inspectors and mechanics, besides the trackmen. These are the men who actually do the work. If only railroad work were the same every day; if there never were accidents, and if our men were immortal, there would be no need of any officers at all on a railroad; but, as I need not say, the work is always changing; accidents will come, and it is constantly necessary to promote old men and employ new. Besides, as we have indicated, the money must be taken care of, and decision must be made as to how much is to be given to the men, how much is to be put back into the road, and how much given to the stockholders, so that some kind of an organization is necessary. Of the rank and file whom we have cited, the one who could probably tell you most about the organization of his road is the agent. Ask him some time when you buy your ticket where he sends the money, and he will tell you it goes to the treasurer. Follow this up by asking him if the treasurer looks after his accounts, and he will say: "Oh, no, that is the auditor"; and that he must report to the auditor whenever he sends any money to the treasurer. Ask him further: "Well, does the auditor tell you what to charge for the ticket," and he will say: "No, indeed, those instructions come from the traffic department." Here then you will find the agent getting instructions from three different departments, and if you say: "Well, which of these is your boss?" then you will run against the operating department, and he will say: "Oh, none of them is my boss. The superintendent is my boss." Thus you will find the agent correctly named. As agent of the company he is the representative of the company acting locally for all four departments, and while he is appointed by the superintendent, while the superintendent pays him, and while the superintendent is the only man who can discharge him, he is yet under the direct instructions of the three other departments.

In the one-division railroad which we have set out to describe, the agent will report directly to the heads of all four departments. And the organization of the finance, accounting and traffic is simply a chief of department at headquarters, with a proper corps of clerks, who work directly with the agents over the line. To be sure, the traffic department, if the railroad is of some importance, may very likely have other local representatives than the regular agent of the company. The city ticket offices outside the station building are usually under the direct control of the traffic department, and so are the soliciting agents, both passenger and freight, who drum up traffic, either at home or abroad. But the treasurer and auditor do not usually have any subordinates outside of their offices, although the auditor has one or more men who travel over the road and check up the accounts of the agents from time to time.

Supposing you have pumped the agent dry, and turn your attention to the railroad telegraph operator. He may very probably also tell you that his boss is the superintendent, but if you follow the matter up a little closer, you will find that there are one or more officers intermediate. On a comparatively small railroad, the operator will report to the trainmaster, who, in turn, reports to the superintendent. If the railroad is larger, so that the trainmaster has a great deal else to do, the operator will probably report to the chief train

dispatcher, who in turn will report through the trainmaster to the superintendent. There is always a train dispatcher at railroad headquarters. Whenever any train passes a telegraph office, the operator telegraphs its position at once to the dispatcher on duty. As the reports come in, the dispatcher records them on a sheet of paper termed a register, which is so arranged as to give what is substantially a graphical representation of the position of the trains on the line. The train dispatcher on duty then knows at any moment the approximate position of all his trains; and with this information at hand, is able to issue train orders directing their further movement. In issuing these orders he uses the superintendent's name, and thus the operators scattered over the line feel closer in touch with the superintendent than do perhaps others of the rank and file.

We have seen how the agent, although he reports to the superintendent, receives instructions on various subjects from other heads of departments. In the same way the operator, who is employed by the chief train dispatcher, may have his office in one of the stations and be under the direction, in a number of matters, of the agent. He must receive and send the agent's telegrams for instance, and is responsible to the agent for the cleanliness of his office. Here is another case where a railroad employee is under a dual responsibility.

This you will also find the case with the conductor of your passenger train. He reports to the trainmaster in most matters, but if you get into a conversation with him, you will find that, like the agent, he sends his money to the treasurer and his report to the auditor, while the traffic department sends him a list of rates on which to base his cash collections. The brakeman, too, although he is employed by the trainmaster, is obliged to obey the conductor in all details while on the train. The freight conductors and brakemen, however, report solely to the trainmaster. Here we have pretty much completed the list of men who report to the trainmaster, forming the transportation branch of the operating department. If you have as good luck in getting information from the engineman, you will find that he is an entirely different branch, the motive power or the machinery department. On a small road you will find that he reports direct to the master mechanic, while on a larger road he will probably report to an officer with functions somewhat similar to the trainmaster, whom we will term the road foreman of engines, but here again you will find that the engineman is responsible to more than one party. The road foreman employs him, has promoted him and disciplines him, but if there is any question of making time or obedience to the train rules, the engineman is just as responsible to the trainmaster as is the trainman, and the same is the case with the fireman, who is, of course, subordinate to the engineman when on his engine. The road foreman of engines, reports to the superintendent, like the trainmaster. The car inspectors also are under dual control. They report to the master-mechanic, but the trainmaster through his subordinates tells them what cars to inspect and when to inspect them.

When you arrive, however, at the mechanics and trackmen, the men who keep the property in repair, you will find the organization simplified. The mechanic reports to the shop foreman, the shop foreman to the master mechanic, and the master mechanic to the superintendent. On the side of the track, the trackman reports through his track foreman, through a supervisor to the division engineer, and the division engineer again to the superintendent. You will note there is one more intermediate officer in the case of the trackman than there is in the case of the mechanic. This is because in general there are more of the trackmen, and furthermore, because they are scattered all over the road in gangs running from four or five up. Each gang is assigned to a section, and, of course, each section must have a foreman; for every fifty miles or so the sections are combined into a supervisor's division, while the division engineer may have perhaps three or four supervisors.

You will see that by beginning at the bottom, we have constructed for the operating department quite a compact pyramid, running up to the superintendent at the apex. The organization may be further elaborated to meet special cases. The superintendent may need a purchasing agent to buy material; he may need a real estate agent to buy and sell his real estate, but in the main, the operating department under the superintendent may be quite fairly looked upon as a triad made up of the three departments, the Maintenance of Way, the Machinery and the Transportation. To be sure in practice your triad breaks up again, the agents and trainmaster are usually independent of each other, and sometimes the chief train dispatcher is independent, also the master mechanic and the road foreman of engines naturally drift apart, even the engineering may separate itself into maintenance of way, bridges, buildings and signals, but the three grand divisions are pretty well recognized, and you will find men calling themselves transportation men, or motive power men in contradistinction from engineers. This division organization I give in this form not only because it is usual, but because I consider it the best. The lines of responsibility are sharply drawn, the territory is not too large for the superintendent to be thoroughly familiar with, and he can know all his men. Having all the operating departments under him, he is ready for any emergency, at any time, and by his intimate association with them all, he can keep them working in close touch with each other.

*A paper read at New York University, March 19, 1902, by Arthur Hale, Assistant General Manager of the Baltimore & Ohio.

This organization can be varied in the direction of what we may call department organization by allowing the engineer to report direct to the president, or the master mechanic may do so, or both. But any such change weakens the hands of the superintendent without strengthening the president. Indeed, wherever a department escapes from the hands of the superintendent it is only too apt to forget that the real object of a railroad is to provide transportation. The engineer will build yards to hold cars instead of to move them, and the master mechanic will think more of his performance sheet than of the amount of tonnage moved.

The difference is perhaps even more marked when we compare the larger railroads. Some of them base their organization upon the division and others upon the department.

The railroad whose organization is based on the division is divided up into territorial divisions, each of which is organized like the division which we have just analyzed. The superintendent on such a system will report to the general manager, who will be assisted by a staff of officers

organization is the better for our great railroads is one of great importance and should be considered in perhaps a more judicial manner than I can assume. With the one-division railroad I dismissed the question by saying that every approach to the department system weakened the superintendent without strengthening the president. For the larger systems I will venture the assertion that every approach to the department system weakens the superintendents without strengthening the general manager.

Strength and weakness are best shown in emergencies, and an actual emergency will best show how division and department organization work. On a certain occasion it became necessary to rebuild certain trestles near each other on parallel railroads organized differently. The superintendent of the railroad with a division organization got his carpenters together at once, bridge carpenters, shop carpenters and all, and ran them by special train to the scene of the accident, with all the heavy timber he could get together, and simply reported the facts to his general manager. The superintendent of the road

especially as his chiefs of department are quite likely to stand up for their own men.

From the side of economy and efficiency the division organization also has advantages. When a superintendent can be held responsible for everything on his division, he will see that he has enough men, and no more, to keep his engines and tracks in condition. Under the department system all the work will be authorized and done on orders from headquarters without so intimate a knowledge of local needs.

Of course the division system has its difficulties. The rivalry is here between divisions instead of between departments. This means that a firm hand is needed at headquarters to keep the rivalry healthy. The objection most often urged, however, is that certain officers on the staff of the superintendent will have a divided responsibility. The division engineer, for instance, must be responsible to his superintendent in certain matters, and to the chief engineer in others. The master mechanic also must serve two masters, the superintendent and the superintendent of motive power. And the subject is dismissed with the dictum, "A divided responsibility will never do."

The gentlemen who take this ground forget that our whole railroad system is based on divided responsibility. The agent reports to four departments, so may the conductor, while the enginemen and the firemen and the car inspectors report to two. If a fireman can safely report to both the trainmaster and road foreman, cannot two of his superiors be trusted to do the same thing?

The only reason that it is safe for the firemen and enginemen to report to two superiors is that this responsibility is carefully defined in the book of rules, and that the men have been carefully disciplined in the matter. There is no greater difficulty in defining the dual responsibility of the division engineer and the master mechanic.

It is obvious that these officers should report to the superintendent in matters of policy, discipline and expense. To the chief engineer and superintendent of motive power they should report in all technical matters. But perhaps the best way to phrase this, is to say that they should report to the superintendent in everything except in matters relating to standard design and method. It has always been recognized that standard designs come under the members of the general manager's staff. Where there has been difficulty, it can usually be traced to misunderstanding as to method of doing work, and the recognition of standard methods should give the staff officers sufficient power as well as plenty to do, for these independent superintendents are sometimes hard to handle.

I have so far kept to my rather dry subject without touching the more interesting and dangerous question of personnel. I think, however, that I am justified in calling attention to the effect of different kinds of organization upon personnel. The department organization is the best school for specialists. It will make you splendid trainmasters and most accomplished engineers in the civil and mechanical branches. But under the division organization you will train all-round railroad men.

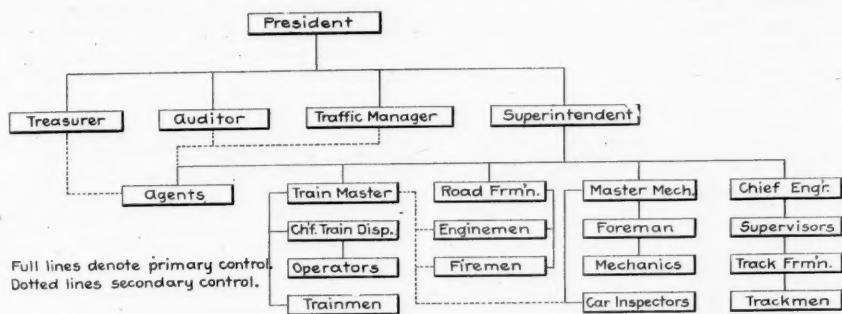


Fig. 1.—Organization of a "One-Division Railroad."

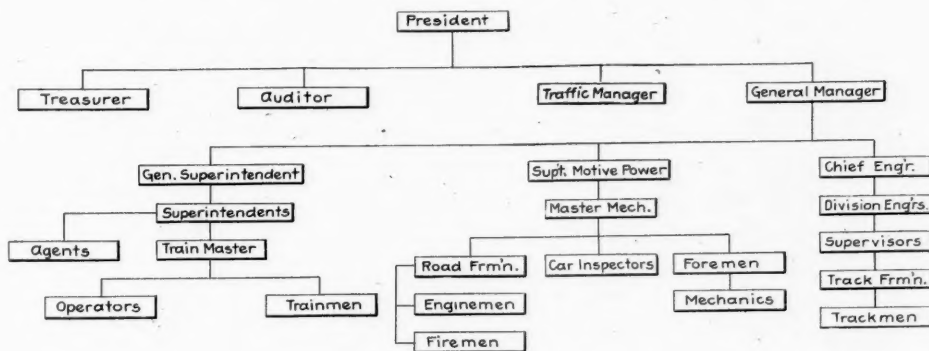
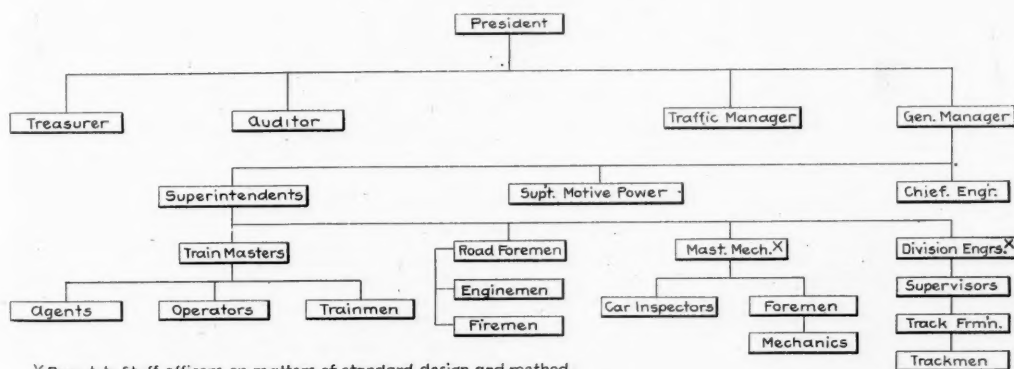


Fig. 2.—A Department Organization.



* Report to Staff officers on matters of standard design and method.

Fig. 3.—A Division Organization.

Diagrams with Mr. Hale's Paper on Railroad Organization.

Note:—The secondary control, shown in Fig. 1 by dotted lines, exists also in the cases described in Figs. 2 and 3, but the dotted lines are omitted for the purpose of simplifying the drawings.

ers covering the various departments. He will have a superintendent of motive power and a chief engineer, with various other minor officers.

Under the department system, the general manager will have a general superintendent, superintendent of motive power and a chief engineer, but these officers will not be properly staff officers; they will be administrative officers. The general superintendent will handle only the transportation, and the superintendents will report solely to him, and will have charge solely of the transportation on their divisions. Under the superintendent of motive power will be the master mechanics. They will be entirely independent of the superintendent. Under the chief engineer will be the division engineers, but they again will be independent of the superintendent.

You will note that under this arrangement agents, operators and trainmen are practically the only ones of the rank and file with whom the superintendent has anything to do. On some roads even the agents are independent of the superintendent, reporting to the general manager through other officers. Under this system the enginemen and firemen report to the master mechanic, except when on the road, as do the mechanics, while the supervisor and trackmen report solely to the division engineer.

The question as to whether a division or a department

with a department organization could do nothing but report the facts to his general manager. The superintendent had no control of the bridge carpenters or the shop carpenters in his vicinity. It was a Sunday, and to tell the truth, he did not know where they were to be found. The general manager was not in much better plight, but he managed to organize a force composed of his general superintendent, his superintendent of floating equipment, and his engineer of bridges, and he made very good time with his trestle. It would have been better on a week day, but the organization went to pieces on Sunday.

Or take a more usual case, the investigation of an accident. A car goes off the track; is the trouble with the car, the track or the speed? We must know, for it must not occur again. With a division organization such a question never goes above the superintendent. He represents the three departments; he knows the territory and will decide the case in short order. Indeed, the mere fact that he will so decide frequently prevents his departments from urging doubtful claims. With a department organization there is no impartial authority on the ground and many investigations are closed without decision. Of course they can be carried to the general manager, but he cannot decide all such questions, more

The Standard Box Car.*

It is not many years since, when any activity on the part of a railroad official, in the way of speaking at clubs or before societies would have been frowned upon by a great number of his associates, and he would probably have been dubbed as "one of those theoretical fellows." Now we find the men who have been doing the most and best speaking and writing forging ahead into the best positions. They are the wide-awake men who think and observe, read and discuss.

It was a great point gained when the American Railway Association took the matter in hand, and decided on Oct. 23rd, 1901, to adopt a standard box car as regards the inside dimensions, and to form resolutions that made it practically a loss to the railroad to build and operate any car of greater or less dimensions.

They very wisely requested the Master Car Builders' Association to consider and adopt the required external dimensions of the standard box car, based upon the internal dimensions prescribed by them.

A point which may or may not be considered an advantage is the width of the door openings. To increase the width of the door openings to 6 ft. is to invite a weakness in construction, and it follows that the door posts and grain doors must be considerably strengthened in order to prevent bulging of the sides of the car, accompanied with all the unfavorable results such as the binding of the side doors, and damage done to them in consequence by irresponsible shippers. I notice that some car builders have provided against this weakness by using a flitched door post, which though not a very slightly affair, will no doubt assist materially in overcoming the stresses at that point, due to increased width and height.

It may be argued that a considerable quantity of the freight carried does not press heavily against the sides of the car, and the apparent defect will only apply to grain and coal carrying railroads. On the other hand, we all know that any car is liable to be loaded and interchanged with a grain or coal carrying railroad.

The extra weight of the grain door due to increased size and necessarily heavier construction will also tend to a more speedy destruction of the door. It seems to be

*Extracts from a paper by S. King, M. C. B. Intercolonial Ry., read at the April meeting of the Canadian Railway Club.

a foregone conclusion among a certain class of shippers that permanent grain doors are only put into cars to be broken up and thrown out when occasion requires, hence some railroads have ceased to equip cars with permanent grain doors, and simply use cheap and rough lumber when occasion requires. The increased cost on account of the increased width of door opening, will be in proportion to the increased thickness and length of the material required.

The increased inside and outside dimensions require that a stiffer frame be constructed to overcome the stresses which consequently necessitates more material, thereby increasing the cost and weight of the car body for a given capacity. I would estimate that the increased light weight of a car of 60,000 lbs. capacity, strengthened in all its parts proportionally for the increased volume as required by the recent standard adopted, to be not more than 1,500 lbs., and its original cost over that of an ordinary 35 ft. car of 60,000 lbs. capacity to be less than \$35, so that these items of cost and dead weight are more than overcome by the increased advantages.

Another point worthy of consideration, is, the necessary alteration in the usual design of side cornice and the design of the door cap, made compulsory by the requirement to construct a car which does not exceed a width of 9 ft. 7 7/8 in. at the eaves, and the height from the top of the rail to the eaves not more than 12 ft. 6 3/4 in. These dimensions do not interfere so much with those railroads who adopt the double board roof as it does with the railroads using the inside metal roof. It would also appear to be a matter of necessity to return to the use of the discarded brake-step on account of the limited height for the brake staff.

A New High-Pressure Balanced Slide Valve.

The illustrations show the latest balanced slide valve of the American Balance Slide Valve Co., Jersey Shore, Pa. It is the design of Mr. J. T. Wilson, president of the company, and has been given the trade name of the "J. T. Wilson High-Pressure Valve." It is guaranteed to work with perfect ease under 250 lbs. pressure per square inch. It is balanced at every part of its travel as closely as the making of a steam tight joint on the seats will permit. The pressure on the back of the valve is varied to suit the uplifting pressure at different points in the stroke, thus giving a practically even balance throughout the travel, while the balanced area of the back is constantly changing, according to the need. There is double steam admission and exhaust opening, the valve is very light and simple, and the entire design is the most interesting that has recently appeared.

It is justly claimed for this valve that its design fully recognizes the value of minimum frictional contact, resulting positive action, durable parts, and constant automatic adjustment of balanced area and of the wear of balance rings. These good features can hardly be over-estimated, particularly on locomotives, since ratings have been systematically raised to require all that a locomotive can put forth in power at its maximum estimated power and with valves supposed to be working freely. The valve is the only moving part and should wear a true seat, as it travels to the extreme edges of the valve-seat at the shortest cut-off. The packing of the balance does not have the reciprocal action of the valve and should therefore remain good indefinitely. We are informed that successful tests of these valves have been made on heavy fast passenger locomotives of the Lehigh Valley, and that the valves are now in regular use there. Other important roads will soon be using them, it is said, and modified forms are being applied to locomotives now building.

The illustrations show the valve and valve-seats designed for external admission, but for internal admission valves it is only necessary to change the arrangement of the balancing rings, and the valve may be changed to meet any condition. Fig. 1 gives a cross-sectional view of the valve and balancing arrangement in position in

valve being alike on both faces, the back of the valve operates against the face of the balance plate in unison with the face of the valve against the valve-seat. The back of the balance plate is a flat surface against which the balancing packing forms a steam tight joint. The balance plate lays loosely on the valve, and is free to lift 1/8 in. It is held central by a self-adjusting, double-taper, cast-iron ring, the lugs on the cover being safety stops. "C" is the cone-plate, which is fastened to the steam chest cover. It contains three cones—one big one and two smaller ones. The rings fitting these cones form the balance for the valve. The main ring, "A," is the balancing ring. The two small rings, "B," are beveled on the outside to withstand pressure from within, and these rings effect the change in the balanced area. Referring to Fig. 4, it may be noted that steam is being admitted to the cylinder port at one face of the valve and to the pocket-port "H," in the balance plate, by the other face of the valve. From pocket "H" it passes through passage "K" into the interior of one of the rings "B," and counteracts the upward pressure of the steam in the port. At the same time it passes through passage "F," in the valve, into the cylinder port, giving double admission. The interiors of the small rings "B" are in communication with the cylinder ports at all times, there being no position of the valve that can cut this communication off.

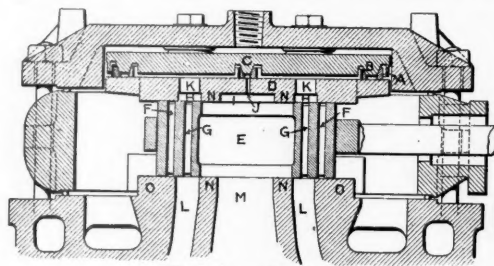
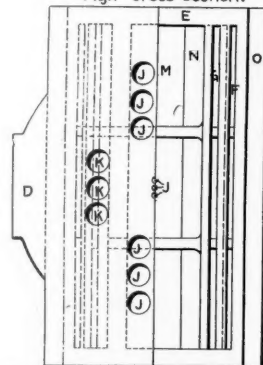


Fig. 1—Cross Section.



Plan of Valve and Half Plan of Balance Plate.

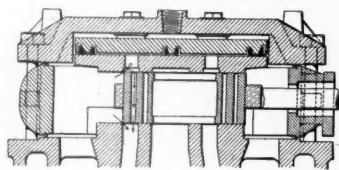


Fig. 4—Valve in Opening Position.

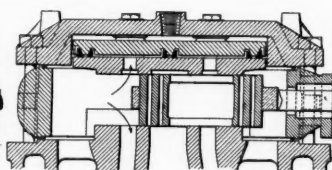


Fig. 5—Valve in Wide Open Position.

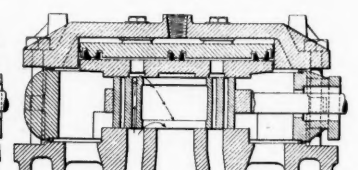


Fig. 6—Valve in Exhaust Opening Position.

The J. T. Wilson High-Pressure Valve.

Descriptive Reference.

- A. Main Balancing Ring.
- B. Port Balancing Rings equal in area each a little more than area of a steam port.
- C. Cone Plate for Rings A and B.
- D. Balance Plate.
- E. Main Valve, both faces alike.
- F. Double Admission Ports.
- G. Double Exhaust Ports.

- H. Pockets in Balance Plate corresponding in length and width with steam ports.
- I. Pocket in Balance Plate to equal Exhaust Port.
- J. Passages from "I" to interior of Ring A.
- K. Passage from "H" to interior of Rings B.
- L. Steam Ports.
- M. Exhaust Port.
- N. Bridges in Seat and Balance Plate.
- O. Outer edge of Valve Seat.

Therefore, whatever pressure is in the cylinder port is on both faces of that portion of the valve over the port, and is on the back of the balance plate in the interior of ring "B," which in area equals the area of the steam port, thereby neutralizing all pressures in the ports, and the valve is balanced regardless of the pressure in the steam port.

In Fig. 5 the valve is over the valve-seat on the right. It is also out from under, or over-traveling, the balance plate seat, and this portion of the valve has pressure on both sides of it and is, therefore, balanced. The balance in this valve is further shown in Fig. 4, previously referred to, where an amount of the valve-face equal to the area of the steam port is instantly balanced by the admission of steam to the port and to the pocket-port "H." This virtually reduces the "size" of the valve from the size shown in Fig. 1, when the whole valve-face is on the seat. This reduction in the frictional contact of the valve is cared for by the reduction of balanced area in equal proportion, and it may be noted that the edge of the valve at the right is at the edge of the seat, and that further movement of the valve does not change the area of contact unless the bridge is over-traveled more than one-third, which, in this valve, with double openings, is not necessary.

Fig. 6 shows the valve at the point of exhausting, and the steam passing out through passage "F" at the same time as at the face of the valve, thus securing the double-exhaust opening.

The well-nigh perfect balance and the automatic adjustment for wear taken with the simple construction of this valve should give economical and efficient service.

Mr. Prouty on the Rate Problem.*

"I was a little astonished and a good deal pleased to know that you were beginning to realize here, at the center of railroad operations, that such a thing as an advance in rates was possible. The general impression is the other way. The statement that rates in the United States are the lowest in the world, that they are too low, that they are continually becoming lower, has been so persistently circulated that it has come to be almost an axiom that discrimination is the only real evil and that there is no possible danger to be apprehended from unreasonably high rates.

"My own opinion is, and always has been, exactly the other way. While it is perhaps true that the crying evil of to-day is the railroad preference, and while the magnitude of that wrong can scarcely be overstated, the ultimate danger which confronts us is the excessive transportation charge. Monopoly has been odious in all ages not because it discriminates, but because it extorts. We are face to face with railroad monopoly.

"Now, why is it that when cost of transportation is decreasing, when tonnage is increasing, when gross revenues are steadily growing larger and net revenues are still more rapidly gaining, the rate itself should also advance?

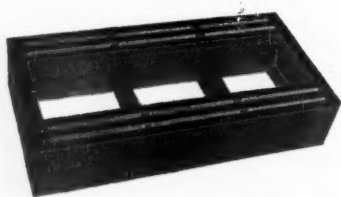


Fig. 7.—The J. T. Wilson High-Pressure Valve.

the steam chest, the valve being in central position on the seat. Fig. 2 is a longitudinal sectional view of the same parts. Fig. 3 is a broken-face plan of the steam chest cover, with the cone-plate in position on the cover, and a half-plan of the balance plate over the cone-plate. Fig. 4 shows the valve at beginning of admission. Fig. 5 shows the valve in wide-open position, and Fig. 6 shows the valve at beginning of exhaust opening. Fig. 7, shows the simple finished valve casting.

In Fig. 1 "E" is the valve. It is open clear through and is alike on both faces. "F" and "G" are slots, or passages through the valve, to give free passage of steam from pocket "H," in the balance plate, to the cylinder port. These slots are so arranged that communication is always maintained between the pocket and the port. "D" is the balance plate. Its face is a duplicate of the valve-seat, and is set in direct alignment over the seat. The

"As I see it, the reason is this: because by various processes there is being eliminated from the railroad operations of the United States the factor of railroad competition.

"It is vigorously insisted that railroad competition does not reduce railroad rates, and that no danger is to be apprehended from the removal of such competition. Upon the contrary, I affirm that no important reduction of general import has been made in the published rate during the last decade which was not mainly due to railroad competition. I affirm the converse—that no advance has been made in the published rate, or in the actual rate, in recent years which has not been effected by the elimination of some railroad competition.

"If you could sit, as I do, receiving complaints from all parts of the country, you would realize in a way which it is impossible to state, how the process of gradually advancing the rate is taking place everywhere, and how in almost every instance it is due to the restraint, in one form or another, of railroad competition. Ten years ago—yes, five years ago—the strife between railroads for business tended everywhere to reduce the rate. Some terminal privilege was given by one line and followed by other lines; some stop-over privilege was allowed, some concession in the way of a classification made. To-day the reverse is true. The terminal privilege is cut off, the stop-over privilege is cut off, the classification privilege is cut off, and just as formerly the granting of the privilege was due to the competition be-

*Extracts from an address at Chicago, April 2, before the Illinois Manufacturers' Association, by Hon. C. A. Prouty, Interstate Commerce Commissioner.

tween carriers, so now the removal of the privilege is due to an agreement between carriers.

"If competition has been the regulator of railroad rates in the past, and that competition is fast becoming a vanishing quantity, what is the remedy? The natural answer is, compel competition by law, prohibit combinations by statute. That is the remedy of Governor Van Sant. That is the remedy of the Attorney-General. It never can be made an effective one. The Northern Securities Company may be dissolved; if it be an illegal institution it certainly ought to be. But what has been gained by its dissolution? A little over-capitalization has perhaps been blotted out; nothing else has really been accomplished. The Great Northern and the Northern Pacific railroads are still owned by the same men. They are friends in fact, and no amount of legislation can ever compel them to fight like enemies. What is true there is true in every other case. You cannot secure satisfactory railroad competition by law. You may compel it in spots and by spasms. You may even secure it, perhaps, upon the surface, but actual, effective competition, competition which competes, will soon be a thing of the past in the railroad world. The quicker we appreciate this fact the better shall we deal with the problem.

"If the owners of railroad property are free to say what shall be charged for the service of transportation, they will in the long run rob the public. No amount of sophistry can disguise it; such a condition is against common sense, common experience and common decency.

"What then is the remedy?

"The railroad is a public servant. Its rates are subject to public regulation. The Government not only may, but should compel the charging of just and reasonable tariffs. That remedy is perfectly adequate, perfectly just and perfectly capable of application. In that way, and in no other way, can the dangers presented by combinations, by the elimination of railroad competition, be dealt with. When there is some competent tribunal, clothed with the power to inquire whether a railroad rate is just and to make it just if found unjust, the danger of combination largely ceases. You and I might prefer competition, but if in the very nature of the case competition cannot be had, we must take the only remedy available.

"A further reason for the exercise of this power by the Government is to be found in the fact that when it is possible to effectively control the rate it also becomes possible to permit within certain proper limits the restraint of railroad competition. One of the most potent factors to-day in the building up and the perpetuating of these great industrial monopolies, of the enormous private fortunes, which seem to be a menace to our civilization, is the freight rate discrimination. These discriminations result largely from competitive conditions. While I do not admit the impossibility of preventing them without the restraint of competition, I do believe that if that remedy could be safely applied it would be in many cases the most effective and the most just one. I also believe that the railroads should be permitted to form traffic associations for the purpose of agreeing upon and maintaining just and reasonable rates. It is impossible to conduct the railroad operations of this country without such agreement in fact. To permit reasonable agreements of that kind, under proper supervision, is the best way of keeping alive what competition is still left. The Traffic Association limits materially, but does not extinguish competition. The pooling contract limits it still further, but something is left. Unity of ownership, or community of interest, absolutely extinguishes it. Is it not better to reasonably limit than it is to utterly destroy?

"It is vastly to its credit that one powerful company in the East has taken an open stand for the amendment of the Interstate Commerce law and has admitted that there can be no proper revision of that law until some measure of protection is accorded to the public. When other railroad lines take the position which the Pennsylvania has, when instead of asserting that the law in its present form is ample they concede its ineffectiveness, when they are willing to submit to intelligent discussion the questions involved, they will find the business men of this country ready to consider candidly these issues and to agree upon some measure which will be just to them and just to the public.

"While many thoughtful men hold the contrary view, my own opinion is that so long as railroads are operated by private capital justice requires that in the first instance the establishment of the rate should rest with them. The carrier should be allowed to say what conditions it will meet, what traffic it will develop, but when once its rates have been put in effect the Government must determine as a measure of self-protection whether those rates are just and reasonable."

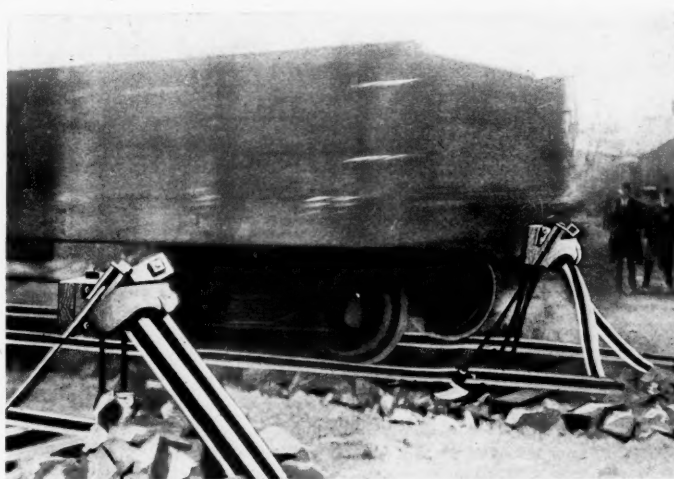
"This has been stigmatized as an attempt to confer autocratic power upon the Interstate Commerce Commission. Apparently the Government can best exercise that function through some commission, and the Interstate Commerce Commission is the body now standing for railroad regulation. That body has never suggested that any power should be conferred upon it which was

not subject in all cases to review in the Federal courts and finally in the Supreme Court of the United States. Personally, I have for a long time insisted that these questions could only be properly dealt with by the creation of a new and special tribunal for that purpose.

"The railroad rate is property. When you meddle with that rate you deal with private property. A slight change in that rate is of great consequence to the railroad and of equal consequence to the public. In all attempts to regulate that rate the greatest caution must be observed. Every safeguard must be used which can insure a fair and just determination to all parties; but, finally, by some means and in some way, the charges which the railroads of this land impose for the transportation of persons and of property must be subjected to public supervision. In no other way can those conditions which confront us be met. You cannot have competition, and you must put something in the place of it."

Test of a Gibraltar Bumping Post.

A test quite out of the ordinary was recently made by the Louisville & Nashville at Nashville, Tenn., with a view of determining the extent to which a Gibraltar bumping post may be relied upon to stop cars under unusual conditions. The place of trial was the McCreary street yards at Nashville, and the post selected was one of a number of this make at this point, and had been in service for about three months, having been installed Nov. 20, 1901, by the Drexel Railway Supply Company. The stub tracks are about 1,800 ft. long, and for a distance of about one-half their length from the point where they leave the main line is a 2 per cent. grade; for the rest of the distance to the several posts there is a one-and-two-tenths per cent. grade. As it is



A Test of the Gibraltar Bumping Post.

necessary that the street should be protected, the maker of the post suggested that the efficiency of the post be decided by actual demonstration. Accordingly a gondola car was loaded with iron ore, the car and load weighing 49 tons. As the car was uniformly loaded and the ore very wet, it formed a compact mass lying very close to the line of impact. The engine attached to the loaded car came down the two-per-cent. grade to the one-and-two-tenths-per-cent. grade, and at a point 740 ft. from the face of the post the car was "kicked" on its way. The distance was traveled in 14 seconds. At a line 265 ft. from the face of the post the car had attained a speed of $11\frac{1}{2}$ miles an hour, and at the point of striking, 16 miles an hour. The accompanying engraving shows the result. The car was stopped and the end settled down over the post. The damage to the car was estimated to be about \$30. The post was repaired immediately by the railroad company at a cost of labor and material of less than \$10. A better idea of the force of the blow delivered by the car is conveyed when it is calculated that the impact was equivalent to a solid block of iron weighing 49 tons, the same as the loaded car, dropping $8\frac{1}{2}$ ft. on a surface 12 in. square. The test was witnessed by a number of the officers of the Louisville & Nashville.

Descriptions and illustrations of the Gibraltar bumping post appeared in the *Railroad Gazette* Oct. 26, 1900, and Jan. 25, 1901, the latter being a modification of the first design, and is the one used in the test. Briefly it consists of a heavy cast-iron bumping head firmly attached to two brace rails extending backward and diagonally downward to the track rails; the track and brace rails are riveted to a broad plate extending across the width of the track and spiked to a broad tie. Passing down through the head and around an inverted rail placed beneath the ties is a $1\frac{1}{4}$ in. "U" rod, which is in tension during impact and resists the tendency of the head to rotate backward. Two 1-in. diagonal rods on either side of the bumping head engage with malleable iron brackets on the track rails, the primary object of which is to act as guys to hold the head central.

A Railroad Where Watches Are Unnecessary.

There is one railroad in the United States on which the block system is used pure and undefiled. It is the Conneaut branch of the Bessemer & Lake Erie, from Con-

neaut Harbor, Ohio, to Albion, Pa. The line is only 15 miles long, but the business sometimes amounts to as much as 53 trains a day, so that the establishment is not to be looked on as an unimportant one. On this line there is no working time-table, although there are three passenger trains each way; and no train order has been issued since May 1, 1899. The passenger trains are guided by the times given in the advertisement issued by the passenger department. The block sections are about $4\frac{1}{4}$ miles apart.

Mr. J. S. Matson, Superintendent of the road, writes us that he intends to extend this method, soon, to other parts of the company's lines. He has issued a little pamphlet describing his plan, which, no doubt, can be had by writing to him at Greenville, Pa. In this pamphlet he gives a code of rules for the guidance of block signal operators. He abandons all classification signals on locomotives, and does not require conductors to make entries in registers at stations. He gives a diagram of lap sidings with starting signals, which signals, however, are not located exactly at the fouling points. A train starting out of the side track gets its "all-right" starting indication from a dwarf signal.

It is proposed to use green for the go-ahead indication in all signals, the markers at the rear of trains being white. The train dispatcher may authorize permissive blocking by directing the signalman to fill out a special card, to be delivered to the engineman.

The Organization of the Air-Brake Department.*

By an air-brake department the writer means a department forming a branch of the mechanical department, and one whose head is subordinate to, and only to, the superintendent of motive power or machinery. As an illustration of the necessity for such a department, in the States of West Virginia, Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, and Kentucky there were in 1900 4,313 locomotives of all classes and 108,959 cars of all classes equipped with air-brakes, which represent an outlay of \$5,800,000, not including the cost of applying this equipment. These figures have been greatly increased during the past year by the additions to rolling stock.

Reliable reports show the number of brakes cut out and inoperative, passing an interchange point to average about 15 per cent. The report of the inspector of the Interstate Commerce Commission shows that he found 13.92 per cent. of the brakes defective. Now that the question of equipping is a thing of the past the question of maintenance becomes all important and the writer believes that this can only be accomplished by the proper organization of an air-brake department. The equipment is now practically all new, and new equipment can be maintained in good condition with a small outlay, while, if allowed to degenerate, it requires a considerable expenditure of time and money to put it in good condition again.

The department should have full jurisdiction over all air-brake matters. All drawings of brake leverage and repair, test or cleaning plants, should be referred to its head for approval or criticism. He should be a member of the board of inquiry investigating collisions or other wrecks or delays in which air-brake questions are involved, either as to their condition or method of handling. The head of the department should examine all firemen or other train men on air-brakes when promotion is considered, and should have full authority as to the hiring or discharging of men employed in his department. The number of men employed, however, should be governed entirely by the superintendent of motive power, as at present.

The general inspector or superintendent should be capable of handling trains in order to show his men how they should be handled. This means that he must be an engineer. With the salary offered at present by most railroads few, if any, good engineers can be found who would accept the position. The dearth of good general air-brake men can be directly attributed to this cause. To support the assertion that it is false economy to put the salary too low I wish to call attention to the fact that one general inspector in the first year of his service reduced the number of slid-flat wheels sufficiently to more than pay his salary four times. The one item of flat wheels is considered alone, no consideration being given to the saving of delays to trains, trains parted, waste of new material, etc. The last named item is quite an important one. The writer knows of a case where a newly appointed inspector hauled triple valves, brake valves, and governors out from under benches until he had nearly \$400 worth of material. He knows of another case in which \$900 worth of triple valves alone were similarly found by a new man. Another similar case for \$1,320 worth of material is also known. In either one of the last two cases named one day's work of the inspector more than paid his salary for six months.

The further contents of the paper deal with the make-up of the repair forces and the equipment for doing the work. The recommendations of the writer are summed up as follows: To sum up, make the position of general inspector one worth having. Doing so will bring out good men. Get the transportation and mechanical departments to pull together in the matter of brake inspection. As long as they work at cross purposes trouble will follow. Make inspection a fact and not a name only. Concentrate repairs, thereby getting better men, as well as effecting an economy.

*Extracts from a paper, by Mr. Robert Burgess, presented at the April meeting of the Richmond Railroad Club.



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EDITORIAL ANNOUNCEMENTS.

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ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The Per Diem Reform.*

The per diem question has been with us for many years, and it has always been a knotty one. It has been discussed, but declared unsolvable many times; and it has been tried a little; and there are thoughtful persons who seem to feel that the prospect of finding a way to settle it is about as poor now as it has been in the past. But the American Railway Association took hopeful action at St. Louis last fall, and its committee is going to bring in a vigorous report at the New York meeting this month; so that there is now good reason why everybody who is interested in the subject should wipe the slate clean of all the greasy old figures of the past and begin anew.

We have put the word "reform" in the foregoing title because we believe that the necessity for the abolition of the present basis and method of payment for interchanged freight cars is a pressing necessity. The mileage plan is so radically wrong that the only way to cure it is to kill it. And we stick to the one phrase "per diem" because we believe that to try a mixed plan would be useless. Those who are not now convinced of the superiority of straight per diem would quickly be convinced, we believe, if they were to thoroughly study the question.

A large majority of the railroads now want to adopt a per diem basis; that is to say, the officers who are directly interested have a lively and intelligent appreciation of the benefits which may be expected to follow the desired change. Many of them are still fearful of the difficulties that will have to be met, but they really desire a change. They are convinced that the proposed change will lead to a much more profitable use of cars.

And this is a matter in which a majority that includes nine-tenths or more of the important roads can have its way, if it is guided by justice and if it persists. As there are a dozen different interests in the American Railway Association, any one of which is too powerful to be subjected to any important injustice, it would seem that on that score there is nothing to fear; and the committee of that association which has the matter in hand may be trusted to exercise in itself, and to incite in other men, all necessary or desirable persistency.

And if the majority has the power and the wisdom, why delay action? Nobody would be appreciably wiser on this subject after a further delay of five years, than he is now. In fact there is no more wisdom now than there was in 1888, when the Trunk lines tried per diem before, except in two particulars. Mr. Daly's experiment on the Illinois Central has afforded some evidence in favor of the per diem principle to those who had not been convinced by the

earlier experience and by argument; and the "community of interest" idea has lately convinced some higher officers that the immediate daily cash balance is not the sole basis on which to fairly and truly estimate the success with which a superintendent is carrying on his work. This last is rather a vague ground to present in a written argument, but when it comes to decisive action it may become of the highest importance. The readiness of your president to put up with an apparent loss—and perhaps even a real loss, for a few months—may be the ruling factor in the success of a new scheme in which you depend on convincing your neighbors by the test of experience.

The merits of the per diem plan may be summarized in a single sentence: it puts a premium on the prompt return of borrowed cars. The present plan allows indefinite delay, and the owner of a car never knows whether a borrower is paying for all the miles which the car is run. There have even been flagrant cases of intentional cheating. And what are the demerits of the per diem principle? Practically none, whatever, except such as are really inherent in the mileage plan also. They are due to the fact that a single arbitrary rate has to be applied to a great variety of conditions; and the mountain of difficulty now confronting the railroads is due solely to the expectation of financial damage to many railroads, shippers and consignees. The mileage rate is also arbitrary, and its operation subject to great inequalities; but it works without much friction because all interests have been adjusted to these. A readjustment will bring great benefits but will be sure to cause some incidental damage. We need not stop here to consider the bearing of the numerous cases where roads now enjoy a marked unjust advantage, and (as it is known that per diem would compel a better measure of justice) are opposed to a change purely on narrow grounds of immediate self interest.

The adoption of a single rate for large and small cars, for long and short journeys, and for all commodities regardless of the time they will require for unloading, can be nothing but one grand compromise. Everybody must admit this. No compromise ever satisfies all concerned at the outset. More than this, some roads when hiring cars by the day will have to pay so much more than they now pay that the new compromise rate, as compared with the old compromise (mileage) rate, will leave them permanently the poorer, as far as car-cost is concerned; and they will have to recoup themselves by getting more money for the transportation and handling of the goods which the cars contain. This is the crux of the matter. If a car stands too long for unloading, the owner of the goods must be made to bear the burden. If the average per diem charge is excessive for the time that the railroad—as distinguished from the consignee—is using the car, the fact shows that some other road participating in the use of the car (and in the revenue from its use) is getting the car too cheaply. The loser must get more of the revenue and the gainer must accept a smaller part. This adjustment cannot be made by a variable rate for the use of the car, because uniformity in the rate everywhere is an essential to success in keeping the accounts; and therefore it must be made in the freight transportation rate—in the distribution between connecting roads of the joint revenue derived from the use of the car.

Now, when we come to the practical question of how to make and set in operation this compromise of compromises, what can be done? It seems to us that, aside from questions of accounting (including the additional expense in the car record office) which, we may assume, can be settled by a reasonable amount of negotiation, the whole problem may be included under three heads: (1) The danger that borrowers will unfairly retain cars for use in local traffic; (2) The switching roads' claim that they can never recoup themselves if they have to pay for the use of cars; (3) The necessity of a plan for notifying connections when it is foreseen that cars will have to be refused. The last point is essentially a clerical matter. It involves only the systematization of a practice already well understood, for everybody has had to resort to this expedient occasionally.

The first point can be arranged by a compromise penalty rate; and it is hard to see how it can be arranged in any other way; for to leave each case to be settled on its merits as it arises, which would involve unending negotiations, would not be settling the question at all. If a road keeps a car two weeks when it ought to keep it only one, it is just and fair to increase the rate after the first week without notice. The same principle ought to be applied against consignees, if necessary to spur them to reasonable activity.

The second point includes better enforcement of demurrage and readjustment of freight-rate divisions (which latter includes the matter of increased switching charges). Demurrage will be a tough problem; but the present demurrage bureaus have made it far easier than it was in 1888; and every manager knows that justice to his own road demands that he take heroic measures to reduce the use of cars as storehouses.

The readjustment of the divisions of freight rates is the one remedy that can be applied to every sufferer's woes, and yet this is the one point on which there seems to be the least certainty of sentiment. Every question of this kind brings up all the perplexing grounds for disagreement which general freight agents have to worry over for 365 days in the year, and is particularly discouraging to the transportation officer, because he must have the freight agent's aid in settling it—or rather, perhaps, in most cases, wait for the freight agent to settle it alone. As is well known, the New England roads are the ones which have thus far most loudly complained of the prospective burdens of per diem. When a trunk line officer was asked how far he had got in his negotiations toward giving his New England connections a larger share of the through rate from Chicago, he replied that the New England roads were getting too much of it already! A situation like that affords first-class ground for a fight; but, of course, the true solution is compromise; which, in this case, means arbitration. Usually arbitration comes only after a fight; but as in this case everybody is civilized what is to hinder arbitrating before fighting? If any reader thinks that this article is mostly a ringing of changes on the one word "compromise" we shall not deny the charge; but is not that what the meeting of April 23 is to be held for?

The word arbitration suggests that an arbitration committee will be the mainstay in any new plan that may be adopted. We understand that the committee in its report has provided for this, and is prepared to offer a workable plan. With a committee of strong men, and enough of them to insure friendly, intelligent, patient and prompt attention to all the different geographical interests, per diem can now be adopted, probably, as easily as ever it can; and shall not the thing be done?

Railroad Regulation in Cuba.

The Military Governor of Cuba has promulgated a general railroad law for the island, governing the organization of corporations for the building of railroads, the conduct of their business, and the manner of the control to be exercised by the government. In most of the world except Great Britain and its colonies and this country, the governments virtually dictate the location of the railroad systems, and secure, to a great extent, a certain territory to a certain line, generally requiring that the corporation which receives a concession for a very promising line shall build branches or other lines which otherwise would not be likely to be built. The new Cuban law, however, expressly provides that no corporation shall be protected against competition; though the Railroad Commission (consisting of three members of the Cabinet) may prevent the construction of any line which they may regard as without public advantage. Apparently these three representatives of the public—the Secretary of Public Works, the Secretary of Agriculture and Commerce, and the Secretary of the Treasury—have complete power over the rates which the public shall pay. The companies must submit to them schedules of their rates, "and the Commission shall in the first instance have the power to alter or amend such tariffs, after giving the company an opportunity to be heard; and thereafter at intervals of not less than two years such tariffs shall be subject to the revision of the Commission." Nowhere in the law do we find that the company has any right to charge enough to make any interest on its investment. Substantially the only important right secured to the company is the right to appeal to the Supreme Court of Cuba against any unjust action of the Commissioners.

Generally, it may be said, the effectiveness of a railroad law with many minute regulations, such as are practically universal on the continent of Europe and were doubtless introduced into Cuba by Spain, depends on the existence of an expert administrative corps, and high intelligence and perfect integrity in the chief organs of the government. Cuba is not so large but that its transportation interests can be grasped and followed by a not very large staff of officials. Whether these can be provided, however, is another question. Precedents for them cannot be found in this country, and it is to be feared that Cuba's mother country affords rather the form than the reality.

That there would be any general rush of capital to build railroads in Cuba under any conceivable law may be doubted; the Van Horne enterprise, now well under way, is probably all that conditions justify. Under the Spanish regime a considerable system was chartered, and maps published just before the war gener-

*For previous discussions of this subject see editorials, Nov. 22, 1901, page 808, and Dec. 13, page 860; contributions Jan. 10, page 22; March 21, page 201, two articles, and April 4, page 237; also Feb. 28, page 141.

ally show these lines as completed. A large part of the mileage never was built, however. Cuba has the disadvantage of all islands of moderate extent, that it cannot develop any great through traffic. A line from New York to Pittsburgh, from Buffalo to Chicago, from Chicago to Omaha, receives contributions from thousands of miles of railroad further west; lines in Cuba must be supported practically by local traffic alone. With sugar a profitable crop this may be very heavy in many parts of the island, however. In weight of crop per acre, no grain crop can compare with it. Cuba is not a new country, however. Compared with area cultivated, none of our States has so large an agricultural population; and it is not to be expected that it will grow as our Western States did when their lands were made accessible by railroads. The island is narrow, and no part is distant from the sea, so that long hauls by rail are not required. And it has and always has had access to the world's markets from its ports by the cheapest form of transportation, so that it cannot be so much benefited by cheap railroad transportation as countries in the interior of large continents.

Railroads in Argentina.

The Argentine Republic in 1898 had 9,909 miles of railroad, of which 5,840 miles was of 5 ft. 6 in. gage, 917 of 4 ft. 8½ in., 3,116 of meter gage, and the balance of 24-in. and 30-in. gage. The republic is in many respects extraordinarily well-fitted to become a great agricultural State. Its vast plains, answering to our prairies, producing wheat, corn and grass abundantly, reach nearly to the seacoast, and are approached on one side by a great river, with no Niagara, which for 100 miles from the sea is equivalent to a bay, being 30 miles wide at Buenos Ayres; while the Paraná and Uruguay, great rivers which form this estuary, are navigable to and beyond the northern boundary of Argentina. Nearly all the grain-growing and grazing country is within 500 miles of a seaport, and the fertile country more distant is chiefly tropical.

Not many years ago this country was known only as a grazing country, with countless herds of cattle and horses and flocks of sheep, and its exports were chiefly wool and hides, meat being unmarketable in the state of the art of transportation at that time. Some 20 years ago, when it became evident that the pampas could produce and market in Europe immense quantities of grain and meat, one of those frenzies common in most new countries took possession of Argentina; and an effort was made to develop the whole country at once, as it were. The government took the foremost part in this. Special efforts were made to encourage immigration, with great success; for something like a million arrived from Italy, forming nearly one-fourth of the entire population. Subsidies were granted to many railroads, and their construction gave employment and made flush times. The bonds guaranteed by the government for railroads amounted to more than \$83,000,000, and one-third of these bore 7 per cent. interest and another sixth 6 per cent. There came a time in 1890 when the government could not meet its engagements, and scarcely anyone else could. The government paper fell lower than our greenbacks during the Civil War, and it is still far below par; and the whole country has been making its way painfully and slowly towards solvency. Fortunately for the government, a large number of the railroad companies which it had subsidized so liberally were unable to fulfill their side of the contract; and this has enabled it to settle with them by issuing its own bonds for 44,200,000 pesos (a peso = 5 francs = 96½ cents) in place of \$2,300,000 guaranteed at high interest, leaving now in force only 3,700,000, on the Transandine Railroad.

The first railroads in the country were built by English companies. During the furor for building previous to 1890 a number of lines were built by the national government, and a number by the provinces, answering to our states. The ownership is very much divided, there being 30 companies, or administrations, for the 9,909 miles of railroad. Only one has as much as a thousand miles, and it has 1,600—a compact system. A second has 931, a third 845, and a fourth 813. The other 26 companies have in the aggregate but 5,711 miles, or an average of 220 miles each, which is not conducive to economical working. The average capital per mile is \$52,702 gold. This seems not heavy; but the country is for the most part very favorable for railroad construction, level, and with few water courses. Moreover, the railroads are generally very lightly equipped. The 9,909 miles at the end of 1898 had 1,180 locomotives, 1,547 passenger cars, 921 baggage cars, and 32,400 freight cars. The average for an equivalent mileage in the United States was 2,050 locomotives, 1,900 passenger and baggage cars, and 72,804 freight cars; while the capacity of locomotives and all cars was much the greater here, and of freight cars probably twice as great as in Argentina.

The development of Argentine resources has been rapid, if not so rapid as was contemplated when so much was done for it. In favorable seasons it exports considerable quantities not only of wheat, but of Indian corn; and it is the only country except this which produces considerable quantities of corn for export. The exports of canned and frozen meat are large, and those of wool have continued. But, notwithstanding this, the railroads as a whole have a thin traffic, the movement averaging 57 passengers and 165 tons of freight each way daily; here it was 107 passengers and 904 tons of freight;

and even in the part of this country where traffic is thinnest, west of the Missouri and the Mississippi, the traffic equalled 53 passengers and 455 tons each way daily. Naturally, in a country where most products reach the sea in less than 500 miles, and where products of mines are almost nil, there is not to be expected so heavy a freight traffic as here; but that it should be three times as great in our "Great American Desert" as in Argentina will surprise some of us. Per inhabitant, the traffic equalled 103 passenger-miles and 293 ton-miles in Argentina; 191 passenger-miles and 1,621 ton-miles here. The average rates in Argentina were 3.02 cents (gold) per passenger-mile (the travel being about equally divided between the first and second class passengers); and 4.29 cents per ton-mile. The latter, of course, would be utterly impracticable on the chief Argentine products were the hauls long. The average trainloads are very light, the average net load per train (both freight and passenger) being but 78 tons. Yet with the high rates the earnings per train mile are \$2.03. The expenses per train-mile were \$1.76. Fuel cost a little more than 10 cents per engine-mile. The number of employees was 37,539, which is only 3.79 per mile of road; but in proportion to traffic the number is large, the work done averaging only 11,027 passenger-miles and 31,370 ton-miles per man employed; against 15,708 passenger-miles and 133,130 ton-miles per man employed in this country. The average yearly pay in Argentina is \$353 (gold) per employee; in the United States, \$563. Assuming one passenger-mile to be equivalent to two ton-miles, the American employee does three times as much work as the Argentine, and receives 60 per cent. more pay. Apparently, there is room for a great deal of improvement in Argentina; but it would be absurd to expect there a performance approaching that which our railroads have attained.

In the Massachusetts Legislature, where the proposition to reduce railroad fares throughout the State to two cents a mile has been brought up nearly every year for a long time, there was a vote last week which showed more than a two-thirds majority in favor of the bill. This vote was in the Lower House, and it was taken after a long debate, in which the railroad committee argued against any reduction of present fares. Members of the committee said that to order reduction to two cents of all rates now higher than that, would reduce the receipts of the railroads \$600,000 yearly, and that the benefit to individual passengers would be small. The unexpectedly large vote in favor of a compulsory reduction is probably partly explainable by the fact that persons buying 500 miles at one time already have the benefit of the two-cent rate. The legislators look upon the \$10 book as conclusive evidence that the roads can afford to carry everybody at the book rate. Judging by the experience of the New York, Ontario & Western, during the past four years, it is quite possible that they could. That road reduced all tickets to the two-cent basis on May 1, 1898, doing this in order to avoid compliance with the State law requiring the issue of 500-mile books at \$10. The Ontario people looked upon this form of ticket as extremely objectionable. The probable loss appeared, at that time, to be about \$100,000, unless there should be an increase in the number of passengers. But the result was that there was no loss whatever in gross receipts, there being the first year an increase of \$3,000, or about one-half of one per cent. The number of local passengers increased 217,535, or 43 per cent. (All these figures refer only to purely local business.) The second year there was a further increase, the totals being as follows: First year of 2-cent rate, receipts.....\$520,644 Second year of 2-cent rate, receipts.....598,457 Third year of 2-cent rate, receipts.....643,871 Thus there has been in the three years (fourth not yet reported) an increase in local passenger receipts of 24 per cent. The general prosperity of the country is, of course, to be credited with some of this increase, but it would be difficult to say how much, for there is no other road with which the Ontario could be fairly compared. It should be said that the former rate of three cents a mile did not apply to all local traffic; there were numerous round-trip tickets and other special forms, which were mostly sold at two cents a mile. These special forms were all withdrawn.

The leading Russian newspaper claims to have authoritative information that the government contemplates a change in the railroad rates which will advance fares for long distances, and some of the freight rates. Something, it is said, must be done to increase earnings, as expenses have increased materially. As Russian industries are just now in a very bad way, some apprehension is felt that an advance in railroad charges may prove disastrous to them. The present tariff in its chief features has been in force seven years. For long distances the rates are very low, and for passengers absurdly low, so that their application on the Siberian Railroad makes it impossible to pay expenses.

NEW PUBLICATIONS.

Locomotive Sparks. By W. F. M. Goss, Dean of the Schools of Engineering and Director of the Engineering Laboratory, Purdue University. Eight vol., vii. + 172 pages, 69 figures. New York: John Wiley & Sons. London: Chapman & Hall, Limited, 1902. Cloth, \$2. Important extracts from Prof. Goss' book have been published in recent issues of the *Railroad Gazette* and

they give a pretty good notion of the matter treated and the method of treatment. A more comprehensive statement of the ground covered appears in the following list of chapter headings: The Locomotive, Fundamental Conceptions; Conditions Affecting Furnace Action in a Locomotive; Cinders and Sparks; Spark Prevention; Front End Arrangements; The Action of the Exhaust-Jet and the Distribution of Sparks Within the Stack; Spread of Sparks as Disclosed by Observations Along the Right-of-Way; Theoretical Considerations Affecting the Spread of Sparks by Moving Locomotives; Chances of Fire from Sparks; The Purdue University Locomotive Testing-Plant. The book, so far as we know, is unique. It contains a great deal of information derived from actual experiment and observation. The chapters on front-end arrangements and on the action of the exhaust jet collect drawings and descriptions from many sources which will be found of peculiar interest. The whole matter is presented in a clear and compact way, making it especially available to busy men. The drawings are excellent and are well printed.

Locomotives at the Paris Exposition of 1900. By F. Barbier and R. Godfrenaux. I. Locomotives; II. Electric Locomotives and Motors. Quarto, 314 pages and many plates. Paris: Vve. Ch. Dumod, 1902.

Mr. Barbier is one of the engineers of the Northern Railroad of France; Mr. Godfrenaux is also an engineer, and is well-known as a writer on locomotives and allied matters. Much of the information which they have collected in this volume has already appeared in the pages of the *Revue Générale des Chemins de Fer*, but it seemed to the authors and publisher that if collected they might be better preserved and consulted, which was a most commendable enterprise. At the same time an introduction has been written which presents in a general way the most striking and recent advances in locomotive and electric motor practice. The bulk of the work is given up to description in considerable detail, of the numerous locomotives shown at the Paris Exposition. These numbered in all 68, of which 18 were from France and 14 from Germany; no other country showed more than six. It is interesting to see that of these 68 locomotives, 35 were compound. It is not necessary that we should say anything now of the individual locomotives described in this volume, for most of those which were of particular interest have already been presented to our readers at one time and another. With the volume there are 73 plates, most of them folded sheets of two pages. Obviously, such complete illustration makes this collection a most interesting and valuable record of the Exposition of 1900. It is printed only in French.

TRADE CATALOGUES.

Mechanical Stokers.—The Day-Kincaid Stoker Co., Cincinnati, Ohio, has issued a booklet quoting the opinions of some railroad officials who seem to agree that heavy engines could be fired more efficiently and economically by a mechanical stoking device than by hand.

Drill-Press.—The Knecht Brothers Co., Cincinnati, Ohio, have sent out a small catalogue containing specifications and general information about the Knecht friction sensitive drill-press, illustrated in the *Railroad Gazette* Nov. 22, 1901, p. 811. There are many testimonials representing a wide acquaintance with the machine and it has apparently won much favor.

Machine Tools.—The Hilles & Jones Co., Wilmington, Del., have just issued their Catalogue S, showing machine tools for working plates, bars and structural shapes. There are 26 pages of fine illustrations of punching and shearing machines, dies, and punches. Motor and belt-driven machines of many kinds are briefly described. The catalogue has a novel covering of gunny-sack material, and may be called a bag of good things.

Notes in France.

The Paris, Lyons & Mediterranean will while hauling the Barnum & Bailey trains, out of Paris, as far as Laroche, use their new Atlantics so there will be seen an American engine with an American train running out of Paris. The trains are composed of 18 cars and weigh 408 long tons.

It is said that the Northern of France is building at the present moment an express engine of the Atlantic type with a water tube boiler. There are already running in England engines with water-tube boilers.

The Northern of France make use of a system of audible signals to indicate when the distant signal is at caution. Between the rails is placed an insulated brass plank called a "crocodile" about 6 ft. 6 in. long. This is so arranged that when the distant is on the height is increased enough to enable a wire brush fitted to the engine to pass in contact with it; this is a conductor which operates a whistle in the cab from the compressed air; so the engineman is sure to hear the whistle and know where he is. This requires the fitting of each distant with the necessary batteries and their upkeep, as well as the engines themselves, but they do not seem to find this very much and are quite satisfied with the system. The P. L. M. is engaged in designing an even more ingenious plan to register in the cab, but so far it is not forward enough to give particulars.

R. HOPE.

Masonry.

The Committee on Masonry, in continuing its work for the past year, has considered that some detailed consideration of classification of the different kinds of masonry might be of practical value to the members, and might possibly lead, in a measure, to uniformity of practice, so far as such uniformity is possible and desirable. To that end standard specifications and other data, in regard to their practice and customs as to masonry construction, have been obtained from nearly seventy of the railroads of the United States, Canada and Mexico.

It seems feasible to have substantial agreement on some classification that can be made to apply to general practice throughout the country. It is conceivable that an outline may be made that will differ but little from the best practice, and that can, by minor amendments, be easily made to include the particular specialties that any road may think desirable for its conditions. The basis of such an outline is presented in this report.

Before giving a suggestion for description of the several classes of stone masonry, a general definition of masonry is submitted, as follows:

"Masonry, in its widest sense, includes all constructions of stone or kindred substitute materials, in which the separate pieces are either carefully placed together, with or without cementing material to join them, or, if the pieces are not separately placed with care, are encased in a matrix of firmly cementing material."

This definition is intended to cover everything properly classable as masonry.

Besides the general gradation of masonry, as to quality, there are various special sub-divisions to be noted, all, of course, still subject in their own class to the range of quality from good to bad. For reasonable clearness, masonry should usually be named under the proper one of such sub-divisions. Some of these may be named as follows: Stone masonry, with numerous possible qualifying descriptive terms and variations; brick masonry, and concrete masonry. These three sub-divisions may perhaps be construed to cover nearly, if not quite all, masonry. It may be of no little value for this Association to give the authority of its approval to a sound and comprehensive definition of what constitutes masonry.

After offering for criticism a definition for masonry, the Committee further presents a suggestion for some particular descriptions in the hope that it may do something to harmonize good railroad practice in usual masonry construction. The attempt is made to furnish enough of an outline to constitute a good, common nucleus, to which different parties may add other particulars descriptive of the peculiarities of their various situations. The outline here given might be printed on two leaves of usual contract form, leaving sufficient blank space at end of each class description for such special amendment as might be desired.

Stone Masonry.—All stones used for masonry shall be sound, durable, not liable to be affected by the weather, from sources approved by the engineer, and shall be laid on their natural beds.

Mortar, for laying up stone masonry, unless otherwise expressly stated, shall consist as follows: Either one part of approved Portland cement to four parts of good, sharp sand, or one part of approved natural cement to two parts good, sharp sand, all to be very carefully measured and mixed, and to be used within one hour after mixing, and always before it shall have commenced to set.

Mortar, for pointing, shall consist of one part Portland cement to one or two parts of sand.

(Space for additions.)
Finished copings, parapets, bridge-seats, and other finely dressed special stones.—Work that comes under this head shall be of selected stone, of the best quality, free from defects, shall be very accurately cut, being finely bush-hammered where called for, and as per plan and dimensions given. To be laid to $\frac{3}{4}$ -in. joints.

(Space for additions.)
First-class Masonry.—First-class masonry will be laid in Portland cement mortar, in regular courses, each stone being carefully cleaned and dampened, if desirable, before setting. The face stones shall be rock-faced, with edges pitched to a straight line, and no projections exceeding 3 in. A draft line, 2 in. wide, shall be cut at each angle in the masonry. The beds throughout and the joints for 12 in. back from the face shall be dressed to lay to $\frac{1}{2}$ -in. joints. No course shall be less than 12 nor more than 30 in. in thickness, and the thickness of any course shall not exceed the course below it. Stretchers shall not be less than 3 ft. long, and not less than 18 in. wide, nor less in average width than $1\frac{1}{4}$ times its height, and at no single place less in width than height.

Headers must not be less than 4 ft. long, where the wall is of sufficient thickness, and the majority shall exceed that length. Where the wall is not over 5 ft. thick, they shall extend entirely through the wall. Headers will extend at least 20 in. beyond the width of the adjacent stretchers. The usual arrangement shall consist of headers and stretchers, alternately arranged, so as to thoroughly bond together the face stones and the backing; for rare exceptions, two stretchers will be allowed to one header, by special permission, to cover each such case. The stones of each course of the face must break joints at least 1 ft. with those of the course below. No hammering will be allowed on any stone after it is set. Each stone must be set upon a full bed of fresh mortar, the broadest bed down, and brought to a firm and level bearing without spalls or pinners.

Backing.—The backing shall consist of large-sized, well-shaped stones laid in full mortar beds and breaking joints so as to thoroughly bond the work together. The spaces between the larger stones shall not be over 6 in. in width and shall be thoroughly filled with small stones and spalls laid flat, and all spaces flushed full with mortar. The courses shall correspond with the face stone, but may be made up in part by two thicknesses, providing no stone less than 8 in. thick be used. In cases approved by the engineer, satisfactory Portland cement concrete may be used for backing.

Second-class Masonry.—Second-class masonry shall be laid in cement mortar. The face stones shall be rock-faced, no projections over 3 in., edges pitched to a straight line, shall have parallel beds and rectangular joints. The beds and joints for 8 in. back from face shall be dressed to lay not over $\frac{3}{4}$ -in. joint. The stones need not be laid up in regular course, but shall be laid level on their natural beds, shall be well bonded, having at least one header 3 ft. 6 in. long to every three stretchers with joints well broken; no stone shall be less than 8 in. thick, and no stone shall measure in its

least horizontal dimensions less than 12 in., nor less than its thickness.

Backing.—The backing shall consist of well-shaped stones, not less than 6 in. thick, and of which at least one-half shall measure 3 cu. ft., to be laid in full mortar beds, with joints well broken, well bonded together, and with the face stone. All spaces to be thoroughly filled with small stones and cement mortar.

Third-class Masonry.—Third-class masonry shall be laid dry or in mortar, according to the direction of the engineer. It shall consist of good quarry stone, laid upon the natural beds, and roughly squared, on joints, beds and faces, the stones breaking joints at least 6 in.; the wall shall be bound together by headers, occupying one-fifth of the area of the face of the wall front and rear, and extending through walls 3 ft. or less in thickness; no stone shall be used in the face of the wall less than 6 in. thick or less than 12 in. on the least horizontal dimensions.

The following outline is meant to cover only such points as there seems to be some hope to get reasonable agreement on, leaving further necessary elaboration to individual ideas:

CEMENT CONCRETE.

Cement.—Natural hydraulic cements used shall be freshly made, of uniform quality, so ground that 75 per cent. will pass through a sieve with 10,000 meshes per square inch, shall have a tensile strength on one square inch section of not less than 100 lbs. at age of 7 days—1 day in air and 6 days in water—and not less than 160 lbs. per square inch at age of 28 days.

When mixed with equal parts of good, sharp sand, shall have a strength of not less than 80 lbs. per square inch at age of 7 days—1 day in air and 6 days in water—and not less than 140 lbs. per square inch at age of 28 days.

Portland cement used shall be of uniform quality, so ground that 90 per cent. shall pass through a sieve with 10,000 meshes per square inch, shall have a neat tensile strength on one square inch section of not less than 350 lbs. at age of 7 days—1 day in air and 6 days in water—and not less than 500 lbs. per square inch at age of 28 days.

When mixed with three parts of good, sharp sand, shall have a strength of not less than 160 lbs. per square inch at age of 7 days—1 day in air and 6 days in water.

Cement shall be subject to such additional test requirements as may be especially called for.

Proportions.—Cement and Sand: For natural hydraulic cements, the proportion of cement to sand shall not be greater than 1 to 1, nor less than 1 of cement to 2 of sand.

For Portland cements, the proportion of cement to sand shall not be greater than 1 of cement to 2 of sand, nor less than 1 of cement to 5 of sand.

Broken stone to pass through 2-in. ring, screened gravel or substitute materials—no more of this material shall be used than can be effectually covered and united together by the cementing mortar. It shall generally be moistened before being combined with the other ingredients.

Water.—Sufficient water shall generally be used to make a moderately wet concrete.

The above statements as to proportions are intended for work in the open air and during moderate weather, and such proportions may be varied for conditions of use under water or in freezing weather, the modifications in such cases consisting mainly of using a larger proportion of cement and a less proportion of water than would be used under conditions first stated.

Mixing.—A standard for mixing of the various materials is as follows: Mixing cement concrete by hand labor.—The proper amount of sand shall be spread out evenly on a smooth, tight platform; then add the proper amount of cement, and thoroughly mix the two until the mass is of an even color; this amount of mixing should be equal to four times turning over with a shovel; then add a proper amount of water for the conditions of the work in hand and mix thoroughly again until a good plastic mortar is formed; then add the proper amount of broken stone or clean gravel stones, and again thoroughly mix the mass until the stones are covered with the mortar and all voids completely filled; the amount of mixing for this part of the work should be equal to four times turning over with a shovel.

Cement concrete may also be mixed by well-made mixing machines. Machines will be preferred which permit, first, the dry mixing of the cement and sand, then the addition of the water and stone; also such machines or arrangements as conveniently permit the indefinite continuance or repetition of the mixing process will be preferred to those that have a fixed limit for the amount of mixing they can conveniently give to a given charge or amount of concrete.

Whether in mixing by hand labor or by machines, great care should be taken to keep the mixture entirely free from all foreign substances, like paper, chips, rags, sticks, etc.

A concise statement of the intent of the above limitations for cement concrete may be made something as follows: Using cements that are in quality not any below, but rather above, the average of the good brands in the market, reliable cement concretes may be used with confidence under appropriate conditions, composed as follows: For natural hydraulic cement concrete a good mixture of 1 part natural hydraulic cement, 1 part good sand, and 2 parts broken stone may be considered as good, strong concrete, as practically can be made with natural cement. One part natural cement, 2 parts sand, and 4 to $4\frac{1}{2}$ parts broken stone may be considered as poor and weak concrete as practically should be made with natural cement, to be used in any work to be classed as durable and sufficient for loads usually placed upon masonry of ordinary dimensions. For Portland cement concrete a good mixture of 1 part Portland cement, 2 parts good sand and 4 parts broken stone may be considered as good, strong concrete as practically need to be used for any piece of Portland cement concrete of appreciable bulk. A good mixture of 1 part Portland cement, 3 parts sand, and 6 parts broken stone may be considered as giving a concrete of sufficient strength, when of proper dimensions, for any ordinary masonry construction, and, at many times and places, ample for very heavy work. A good mixture of 1 part Portland cement, 4 parts good sand, and 8 parts broken stone may be considered as giving a concrete of sufficient strength, when of proper dimensions, for much ordinary, plain work in favorable positions. With any of these Portland cement concretes there may be judiciously used, on their exposed faces, a "skin" or facing of rich Portland cement mortar, about $1\frac{1}{2}$ in. thick, to be built up at the same time as the concrete backing, and both tamped well together. This facing should not be too rich in cement, not richer than 1 part cement to 2 parts sand.

In some instances Portland cement concrete has been used in railroad structures, made by mixing the cement direct with certain gravels, as found in favorable banks, without screening to separate the sand and pebbles. It is not thought that such practice could be indorsed for frequent use, or as safe to follow, except with unusually favorable materials, and by individuals whose extensive personal experience might warrant them in it. The range of proportions previously given in this outline may pos-

sibly be as great as might at times be found in some favorable natural gravel banks, but, if the sand and pebbles are separated by screening and then united with the cement in ascertained proportions, assurance can be felt that the desired strength of concrete, not too rich or too weak, is being obtained. There is some difference of opinion among engineers as to the advantages, respectively, of broken stone or natural rounded pebbles for use in concrete. Both are used, and much good work is done with both of them. For the very best work good, crushed trap rock or hard limestone will probably give somewhat stronger work with same quantities of cement than the natural rounded pebbles, especially for tests under one year in age.

Cost of Concrete.—It is very difficult to give any general statement that shall be of value as to cost of concrete masonry work. Referring to railroad structures of Portland cement concrete, such as abutments, culverts, arches up to 30-ft. span, of varying proportions in the concrete mixture, and in widely different situations, the cost per cubic yard for good work that has stood up to its requirements has been variously reported at from somewhat less than five dollars up to about ten dollars. In most of these situations the stone masonry that would have been considered right for the same place would have cost from 20 to 80 per cent. more money. If the structures are considered of equal value, the smaller saving may be well worth making, and the larger saving might many times help to determine the question as to whether a timber structure in bad order should again be renewed with timber or be replaced with something more permanent, upheld by concrete masonry.

In an appendix the committee reprints the articles on concrete masonry by Mr. W. A. Rogers, which were published in the *Railroad Gazette*, 1901, pages 401, 459 and 514.

Conclusions.—The Committee begs to submit the following conclusions for adoption by the Association: That the definition given above be adopted by this Association as a comprehensive definition to cover any kind of masonry, and with the further recommendation that in usual practice the word "masonry" be qualified by some proper term to more particularly describe the kind of masonry under consideration. That this Association approves as good practice for railroad companies to have and use specifications or descriptions of their various kinds of masonry work, separate and apart from any more General Specifications or contract requirements and free from any matter not directly bearing on the character or conditions appertaining to masonry work, such specifications or descriptions to be feasible to attach to and combine with specifications for other parts of railroad construction work when desirable.

This report is signed by E. P. Dawley, N. Y., N. H. & H., Chairman; H. G. Kelley, M. & St. L., Vice-Chairman; W. L. Breckinridge, C. B. & Q.; C. W. F. Felt, G. C. & S. F.; W. E. Hoyt, Rochester, N. Y.; G. F. Swain, Institute of Technology, Boston; C. Lewis, B. & O.; Garrett Davis, B. C. & N.; E. C. Brown, Union R. R., and M. W. Cooley, Boston, Mass.

ABSTRACT OF DISCUSSION.

Mr. Kelley: The committee, in presenting this report, desire to read the conclusions which we present to the Association, and the resolutions which we recommend be passed. There are a number of details in the description of various classes of masonry work, to which the individual members of the committee are not willing to subscribe entirely, although in its general form they have expressed their willingness to sign this report. I will read the first resolution, to which we have made a slight change in the definition of masonry since the committee has come to the meeting:

"Resolved, That the following definition be adopted by this association as a comprehensive definition to cover any kind of masonry, and with the further recommendation that in usual practice the word 'masonry' be qualified by some proper term to more particularly describe the kind of masonry under consideration."

"Masonry, in its widest sense, includes all constructions of stone or kindred substitute materials, in which the separate pieces are either placed together, with or without cementing material to join them; or, when not separately placed, are encased in a matrix of cementing material."

The second resolution is changed to read as follows:

"Resolved, That this Association recommends as good practice that railroad companies prepare and use specifications complete in themselves for all kinds of masonry to be in such form that they may be attached to, and form part of, specifications and contracts for other railroad construction when desirable."

Under "Description of Stonemasonry," we want to strike out the words: "Not liable to be affected by the weather," and insert the words "well seasoned," so as to make it read, "All stones used for masonry shall be sound, durable, well seasoned, from sources approved by the engineer, and shall be laid on their natural beds."

Under the same heading in the sentence, "Either one part of approved Portland cement to four parts of good sharp sand," etc., we wish to substitute "three" instead of "four."

Mr. J. H. Abbott (B. & O.): I ask for information if I understand correctly that the committee recommends that mortar may be used, which has been mixed an hour.

Mr. Kelley: That is the consensus of reports received from the railroads reporting to us, that one hour be the extreme limit after the mixing.

Mr. Abbott: In using natural Louisville cement on the Henderson bridge, we found it necessary to condemn any mortar that had been standing in the mortar mixer over 20 minutes, and under the condition surrounding us there I should not like to see the mortar go in after standing 20 minutes.

Mr. Kelley: I think the committee entirely agree with the remarks made, but in view of the specifications received, one hour was placed as the limit, and then that was modified by saying, "And always before it shall have commenced to set."

President Kittredge: Can the committee cite any instances, and under what conditions, any cement could have stood nearly an hour, and yet be safe to use?

Mr. Kelley: No special case was cited as I understand it.

President Kittredge: It would be interesting to know under what conditions the period of hour could be reached.

Mr. J. H. Abbott: I would move that the words "within one hour after mixing" be stricken out, so that it shall read, "All to be very carefully measured and mixed."

Mr. Kelley: The committee will be pleased to accept that.

Prof. Taylor: The committee uses two terms for the kind of cement in use in this country; throughout the report they call one the "natural hydraulic cement," and the other they simply call "Portland cement." I think we might omit the "hydraulic" and designate the cements as "natural" and "Portland."

Next I would insert in the article for first-class masonry on page 4 the words, "except the coping," so that the sentence will read, "No course shall be less than 12, nor more than 30 inches in thickness, except the coping," etc.

Under the heading of "backing" for first-class masonry the word "backing" occurs twice, and near the center of the page about the fourth line down in that paragraph, it says, "The spaces between the large stones shall not be over 6 in. in width and shall be thoroughly filled with small stones and spalls laid flat, etc." I suggest that there be appended to that sentence the following words, "And all spaces flushed full with mortar or good cement."

Following the words, "In cases approved by the engineer, satisfactory Portland cement concrete," I suggest that the words, "With larger stones embedded in the concrete" be inserted, the sentence to read: "In cases approved by the engineer, satisfactory Portland cement concrete, with large stones embedded in the concrete may be used for backing."

Under the head of "mixing" I would suggest where it says "until the stones are covered with the mortar and all voids completely filled," that we use the word "practical." We do not get the voids completely filled.

Where the committee recommend the concrete for different purposes, where it says, "a good mixture of one part Portland cement, four parts good sand and eight parts broken stone," etc., I would suggest that the figure three be used for the figure four, and that the figures eight to ten be substituted for eight.

President Kittredge: Will the committee take cognizance of the remarks of Mr. Taylor in regard to inserting the words "except coping"?

Mr. Kelley: Yes, sir.

President Kittredge: In the "Backing for first-class masonry," I understand Mr. Taylor wants some discussion—at the end of the middle sentence, he wants added "or good cement gravel."

Mr. Taylor: Yes, I will vote against it.

Mr. Lum: I would object to the use of the word "grout" in that connection.

Mr. E. H. Lee: It might be well to have an expression of the views of the members regarding the use of concrete in place of the old method of using spalls and flushing mortar. It seems to be a practice which is growing among engineers in backing up first-class masonry to substitute the use of concrete in filling the larger spaces instead of using spalls and flushing mortar or using spalls and using grout, as has sometimes been done.

Mr. Kelley: The committee are willing to accept the insertion of the words "except coping," under the head "First-class Masonry." They are also willing to accept "large stones imbedded in concrete, but do not desire to accept, without the direction of the Association, the words, "or good cement grout." The committee, I think, are a unit on cutting out "cement grout" entirely in first-class masonry construction.

Prof. W. D. Pence: The question of using grout is quite largely a matter of the amount of water which should be added to the mortar. If an engineer should occasionally think it is desirable to have mortar in such shape that it will flow more readily, that is a matter of detail; and the specifications themselves should not determine the grout.

Mr. E. E. Hart: We have been taking down some 70 and 80-ft. piers on the N. Y. C. & St. L., at Girard, Penn., and from all appearances those piers were grouted; that is, the spaces between the cut stones were filled with spalls and grout. While we didn't find any large grout, we found a great deal of dampness and frost in the grout, which, I think, led to the disintegration and failure of the piers. From what we have seen there it would almost seem better policy to use mortar.

Mr. Atwood: I would like to express my preference for the use of concrete for the heart of first-class masonry wall over the use of spalls and grout. I think the first practice is first-class and the other is crude.

Mr. A. S. Markley (C. & E. I.): If the grout is properly used I do not see how there could be any void whatever in the masonry. If there is proper care taken the grout will run into all the voids and make them solid.

Mr. McDonald: We had an experience where 300 bbls. of grout were put under one pier and they all run out into the water down the river.

Prof. Johnson: I have known of a number of very serious differences which have been taken into the courts for settlement, in regard to what is meant by "one of cement and three of sand." I have been searching carefully through this report to find out what is meant and I can't find it. Of course the contractor saves about a third of his cement if he is allowed to take it from sacks and dump it out loosely, fluff it up, he can make it fill about 50 per cent. more than it did in the original package. It seems to me it is very unwise for engineers to continue the practice to specify so much cement for so much sand and not find out what that means. The contractor always dumps his cement out loose and measures it up in shovels, wheelbarrows or something, and if the engineer means it to be so, of course it is all right, he writes the specifications with that intention; but many engineers write their specifications expecting the cement will be measured in the original barrels, but they don't say so. Then there is an open controversy.

Mr. Kelley: This is merely an outline specification for cement concrete. We have taken all the information we could; it has been digested as well as possible and it has been presented simply as an outline.

Mr. McDonald: I move that the words "by volume," be substituted after the words "either one part"; also that in the fourth line from the bottom the words "three to four" be put in after "cement," making it read, "one part by volume of approved Portland cement to three to four parts of good, sharp sand."

Prof. Johnson: Would you not define what you mean by one part or volume to four parts of sand?

Mr. McDonald: I mean it shall be measured after taking out of the package loose.

Prof. Johnson: Then should not that be defined, "One part by volume measured loose"?

Mr. McDonald: I will accept the amendment. My object is to get it in the way that it is usually handled by men who handle it.

President Kittredge: As I understand, this discussion is really for the benefit of the committee, and is not being handled in the way of motions and instructions from the Association. If Mr. McDonald will make his remarks in the way of a suggestion to the committee instead of a motion, I think it will be proper.

Mr. McDonald: I will change it from a motion to a suggestion.

Mr. Kelley: I think Prof. Johnson's remarks are very well timed. The question of volume is an extremely uncertain one, as it appears in most specifications. I would regret very much to see the word "loose" go into any specification coming from the Association. It should be either in the original package, or given some more definite term indicating the volume intended to go in.

Prof. Johnson: Suppose a contractor buys his cement in sacks and he has to put it into a barrel in order to fulfill the specifications. He can fluff it a good deal better in the barrel than if it is spread out. Therefore, it seems to me that still does not satisfy, and I don't believe anything will satisfy, if you wish cement measured in the original package, except to say "by volume," the cement to be measured in the original package.

Mr. G. M. Walker: We have used a specification, so many parts of sand, so many parts of grout, and so many pounds of cement of different kinds.

Mr. Davis: I understood all sacks were parts of a barrel, three sacks or four sacks are a barrel when it is received in sacks, so it is precisely the same thing.

Mr. E. H. Lee: One of the most expensive cases with which the speaker is acquainted and under which perhaps 150,000 yds. of concrete have been put in, covered this point in precisely that manner. The weight of the cubic foot of cement was specified, in the case of Portland, at 100 lbs. This perhaps would work some injustice to the manufacturers of certain kinds of Portland cement, which do not weigh quite that much. But after the brand which has been used has been determined it would seem very easy to specify the exact weight which should be considered a cubic foot. Of course in this connection it is not possible to weigh every sack or every barrel that is used. This particular clause in the specifications, as is the case with most other clauses, is simply reserved as a standard, as a rule, which is to be used in case of disagreement.

Mr. A. R. Raymer: We find it makes a difference what the nature of the sand is, whether the particles are of uniform size in each, in which case the voids amount to uniform bulk, and where the particles of sand vary. We have about come to the conclusion that it is necessary to make a test in each case to determine the amount of voids in sand, and then fill those voids with a certain percentage of excess. The amount we have not yet determined. The mixture determined in that way will cover the case exactly and will cut out the necessity for measurements by bulk, by weight or any other way.

Prof. Johnson: I don't know of anything more deceptive in the matter of mixing mortar than to take the criterion that has just been mentioned, of measuring the voids. You can better afford to pay \$6 a yard for coarse sand than \$1 a yard for fine sand, if you use a given proportion of three to one, and wish a particular strength. It is commonly supposed that the function of the cement is simply to fill the voids. That is a mistake. The function of the cement is to coat every grain of sand and to fill the voids. Every grain of sand must be surrounded with a coating of cement, and then the voids also must be filled. The total surface to be coated in a cubic foot of spheres, varies with the diameter of the spheres, and yet the voids still remain the same. So that even mixing fine sand with coarse sand for the purpose of re-

ducing the voids does not help you any, and you always lose by it. The coarser the sand the better, even though the grains all be coarse, and of an even size, and there is no limit I know of to that rule until you get to the size of marbles. The coarser the sand the stronger, and it has been fully demonstrated for a given strength you could better afford to pay \$6.00 a yard for sand varying from the size of a pea down to half that size, than you could to use fine, ordinary sand at \$1.

Prof. Allen: Part of the question is as to how much you can do with a barrel of cement. If you take your marbles, in one experiment, and fill with cement, you get a certain bulk. If instead of filling all the voids with cement you fill part of the voids with sand, you will get your bulk and have some cement left over to make another bulk, and with a barrel of cement I suppose you will get more, if you do have coarse grains with finer grains, filling the voids between them. I haven't kept up lately with the experiments upon mixtures of sand and cement, but I have it very strongly in mind that some experiments have indicated that sharp sand—a mixture with sharp, fine sand and cement gave a stronger mixture than coarse sand and cement. I feel reasonably positive that some experiments have indicated that. I do not see how you are going to escape the conclusion that with the large particles and the small particles filling the voids, a barrel of cement will go further than it will with the coarse particles alone.

Prof. Pence: In the report of the committee there is a very valuable article by Mr. Rogers. I find reference to expansion and contraction of the concrete. I take it Mr. Rogers' contribution is not open for discussion, but I should like to make inquiry in regard to the views of the members along the line of expansion or contraction of long concrete walls such as are used in track elevation. The first two sentences in the paragraph headed "Expansion and contraction" is what I referred to. "Concrete expands and contracts with variations of temperature at about the same rate as iron, and allowance should be made for this in building long walls. In ordinary abutments or culverts where the wall is not over 60 ft. long, the writer has not been in the habit of making any allowance, but for greater lengths he is in favor of dividing the wall into about 40 ft. sections." As a matter of fact, there were some experiments recently made which show that there is a material difference between the expansion of structural steel and concrete. The next sentence also applies to what I have in mind: "In ordinary abutments or culverts where the wall is not over 60 ft. long, the writer has not been in the habit of making any allowance, but for greater lengths he is in favor of dividing the wall into about 40 ft. sections." I have been credibly informed here in the city, in the construction of small walls, rather small cross sections, it was found in the course of one season heavy cracks developed in 60 ft. sections, so that for a light wall the length should be possibly 30 ft. instead of a greater amount.

Mr. Davis: We have some arches 10 to 12 ft. up to 14 and 16. We preferably use three or four rings of brick in the arch along; all the rest is concrete. The principal advantage of using the brick is the economy of putting it in to avoid tamping the ring of the concrete.

I notice in this report that the committee didn't recommend the use of natural gravel. In northern Iowa and Minnesota we have numerous pits of pretty good gravel, except it contains quite a large amount of fine sand. It would doubtless be better if it were screened out. With us it is a matter of expense. If it was screened out we would not have very much gravel left, and besides the expense of handling. If it has clay in it, and it frequently has, we wash it out. In all of our concrete we wash the gravel. And our experience with this gravel in concrete has been entirely satisfactory. We use both natural and Portland. The natural cement is below ground and all above ground is Portland, and we have used a great many yards of it without any ill effects at all in any way.

As to expansion I would be in favor of making an expansion joint every 30 ft. We have tried in one or two instances to make a long retaining wall and we found that it cracked, so that in the future if I put in a plain face wall without an angle, if it was going to exceed 30 ft. I would provide a joint.

President Kittredge: We will pass to the conclusions of the committee, and we will consider that the first resolution is now before you. As amended this resolution reads:

"Resolved, That the following definition be adopted by this Association as a comprehensive definition to cover any kind of masonry, and with the further recommendation that in usual practice the word 'masonry' be qualified by some proper term to more particularly describe the kind of masonry under consideration.

"Masonry, in its widest sense, includes all constructions of stone or kindred substitute materials, in which the separate pieces are either placed together, with or without cementing material to join them, or not separately placed, are encased in a matrix of cementing material."

Mr. C. Lewis: I would like to inquire whether pedestals of mortar would not be considered also as masonry. Might it not be amended so as to include columns and pedestals complete, or should they not be considered as masonry?

Mr. Taylor: I would like to ask the committee whether or not they mean to include rip-rap.

Mr. Kelley: No.

Mr. Abbott: It seems to me the definition of the casts might be considered as material rather than going back to the stage of manufacturing. That is, they become masonry after we begin to form our columns and buildings; they become stone then. I don't see that it is necessary to go back to nature and determine how the rock and

the stone were formed to include it in our definition of masonry.

(The resolution as amended was adopted.)

President Kittredge: The second resolution is that this Association recommends as good practice that railroad companies prepare and use specifications complete in themselves for all kinds of masonry, to be in such form that they may be attached to and form part of specifications and contracts for other railroad construction when desirable. (Adopted.)

Mr. McDonald: I move the report be adopted as a whole. (Carried.)

The Engineer and the Administrator.

In a recent issue of *The Railroad Gazette* a contributor who signs himself "Solon" revives the oft-debated question as to the comparative value of the "self-made railroad man" and the graduate of the technical schools in managerial positions. Under the caption of "A New York Central Defect" he criticizes the directors of that corporation for not advancing graduates of engineering schools to positions of executive responsibility instead of picking men from other roads who have made a reputation as successful railroad managers.

The public has no interest in such controversies except so far as they pertain to the safety of the traveling public. It is willing to leave the adjustment of such questions to the directors of the great transportation systems. At the same time it is interesting to note the fact that a majority of the big railroad managers of the country, under whom the science of railroading has been brought to the highest standards of mechanical perfection, are what are popularly known as "self-made railroad men." They are not graduates of technical schools. Among them may be mentioned Marvin Hughitt and W. A. Gardner, of the North Western; George B. Harris, of the Burlington; A. J. Earling, of the St. Paul; W. H. Truesdale, of the Delaware, Lackawanna & Western; F. D. Underwood, of the Erie; W. C. Brown, of the New York Central, and scores of others who are prominent.

The experience and wide knowledge of the transportation problem gained by these "self-made" railroad men who have attained such success in management could not be gained in a technical school. This does not mean that the technical education acquired in an engineering school would not have been of immense advantage to them as a foundation for a successful career. But they have acquired by wide experience much that the technical school gives and a great deal more that it cannot furnish.

It is true, as "Solon" says, that "a great railroad is now the most complicated machine on earth." But the railroad problem is one of men as well as of machines. The young men of the technical schools may supply valuable expert knowledge of bridges, interlocking signals, electricity and the properties of steam, but over all must be the master mind that grasps the great traffic problem in all its broader aspects, who has the inborn managerial quality, the ability to control and discipline men and to organize machinery and men into a smooth-running system of transportation.—*Chicago Record-Herald*.

The Mines of South Africa.

Mr. John Hays Hammond recently lectured at Yale and at Harvard on mining in South Africa. He spoke both of the gold mines and of the diamond mines, but in the few extracts from his address which we give below we confine ourselves to the gold mines. Obviously, his opinion is of the first importance, and it is agreeable to learn that we may expect so much from that country. The markets of the world will be greatly affected when 100 million dollars of gold begins again to flow out of South Africa.

"The Witwatersrand gold field in the Transvaal is by far the most important gold-mining district in the world. The Witwatersrand district is, in its physical aspect, radically different from the usual mining country. It rather resembles a grazing country, where mining prospectors would pass by contemptuously as 'uncongenial to ore,' and in that respect the occurrence of gold in the Witwatersrand district illustrates the truth of the adage that 'Gold is where you find it.' Gold was first discovered in this district in the year 1885. It occurred in what is called the Banket, which is a coarse conglomerate deriving its name from its resemblance to an almond rock-candy called 'banket' by the Dutch. This nomenclature is about the sole contribution of the Dutch to the mining industry. These auriferous deposits are unique in the history of gold-mining, and are unparalleled in respect to their remarkable consistency and consequently commercial reliability. The ore carries about \$10 in gold per ton.

"The principal mines extend east and west from the town of Johannesburg, 25 miles in either direction. About 100,000 Kafirs and over 10,000 white men are engaged directly in mining; and nearly 6,000 stamps are working night and day crushing over 7,000,000 tons of ore annually. In order to obtain the supply of ore for one year's output it is necessary to excavate eight miles of solid rock, 5 ft. in width and 400 ft. in depth, besides the many thousands of feet of additional shaft sinking, etc. The gold won as the result of this stupendous work is valued at about \$75,000,000. Since 1886 these mines have yielded nearly \$400,000,000 worth of gold. Just

previous to the beginning of the war the Witwatersrand mines were producing gold with a value of \$100,000,000 per annum, more than one-third of the world's output.

"It is customary to speak of such extensive deposits as illimitable, but as an engineer, I am denied the use of such convenient hyperbole; and must endeavor to satisfy the curious by some reply more definite. But the question of the life of these mines is difficult to answer, depending upon the depth to which mining can be profitably carried on, and upon the rapidity of exploitation as well. As to ultimate depth: The geological and mining conditions in the Witwatersrand district are exceptionally favorable and admit of maximum depths. There is but little water to interfere with deep mining. Also, the increment of temperature with the depth is very low, there being only one degree of increment in temperature for 200 ft. of depth. I have on other occasions expressed the opinion that mining will be found feasible to a depth of about 10,000 ft. As to rapidity of exploitation we mining engineers of South Africa, chiefly American engineers, pride ourselves in holding the world's record in respect of speed in mining, and work that has taken centuries in the history of European mining will be done in a decade under the conditions that obtain with us. Therefore, when I speak of mining out an area in the aggregate some 30 miles long to a vertical depth of two miles, I must prepare you as to our capability to undertake rapid exploitation. If I must hazard an expression of opinion, from which the element of guess, though unscientific, cannot be altogether dissociated, I would place the life of the Witwatersrand at 30 years. It may be a short life, but it will be a golden one, for within that period more than \$3,000,000,000 of gold will have been extracted from the mines of that district, a sum more than double that of the entire production of California since its discovery."

Wet, Dry, or Medium Concrete.*

Shall we make our concrete dry or wet; or is there, somewhere, "a golden mean," by striving for which we may attain perfection?

The writer has for many years been engaged in the construction of concrete masonry, and was specially interested in the paper entitled "An Experiment With Wet and Dry Concrete," which appeared in the *Journal* of this society for December, 1900. Believing, however, that the inferences drawn from that experiment were not fully warranted, the writer, assisted by Mr. H. H. Hadsall (Junior Member of the Society), repeated—with some modifications—the experiment narrated in the paper referred to, and feels justified in presenting the results to the society, together with some conclusions drawn therefrom. The modifications referred to were as follows:

First. Instead of making exactly a cubic yard of concrete, a barrel of cement was taken as the unit, and the four sacks making a barrel were dumped loosely into a box, and that box (containing 4.42 cu. ft. when level full) was used as the measure of volume for all materials, which were all measured "loose." As a check, each boxful was weighed, and the water was also both measured and weighed. It seemed proper to make this modification, inasmuch as this would be the natural order of concrete making; for, in practice, we do not gage our ingredients to produce a fixed amount, but measure them separately, as may be convenient, and let the result be what it may. The gross weight of all materials used (except water) in the dry block was 2.3 per cent. greater than in the wet one, while the wet and medium blocks had almost exactly the same gross weight of solid contents. The wet block, as compared with the medium, had 13 lbs. more sand and 3½ lbs. more of crushed stone, but 19½ lbs. less gravel.

Second. In the later experiment, while mixing gravel with the crushed stone to make up the required volume of the grosser material, the sand was separated from it, and exact measures of each were used, making a more definitely composed mixture.

Third. Three, instead of two, blocks were made, in the belief that a medium mixture would be as good or better than the wet one. The volume of water in the several mixtures was as follows:

	Per cent. water.		Per cent. water.
Former experiment, dry	5.5	New experiment, dry	5.1
" " " " wet	10.4	" " " " wet	9.5
		Medium	7.5

In the later experiment it was the endeavor to get enough water in the dry block to make a mealy concrete, but not to flush it. No amount of ramming the thin layers would bring water to the surface. In the wet block, men could not stand on the concrete to ram it; the mass quaked easily, and the mortar stuck to the tamping iron. In the medium block there was enough water so that the top of each layer was flushed by the tamping, but there was no quaking, the mass being always hard. The top surface had enough free water on it to spatter when the tamping was finished.

Fourth. Instead of breaking the blocks at the age of 30 days, it was thought advisable to leave them exposed to the sun, rain, snow, etc., for several months, and to weigh them from time to time and see whether the wet block lost water, and the dry one gained any, also how the medium block showed in this respect.

Fifth. When ten months old, the blocks were drilled

*Extracts from a paper presented before the April meeting of the Western Society of Engineers by H. W. Parkhurst, M. W. S. E.

and broken by plug and feather, in same style as in the earlier experiment.

Having mentioned the differences from the former experiment, it is proper to describe the later one more in detail. The cement used was the "Dragon" Portland cement, made by The Lawrence Cement Company, of Siegfried, Pa. The sand was "torpedo," from Fox River, near Coleman, Ill., and the gravel was from same place, both got by a washing plant, and therefore very clean and good. Crushed stone was the ordinary "medium," from Dolese & Shepard's Hawthorne quarry.

The following table gives data as to these materials:

	Sand.	Gravel.	Stone.	Cement.
Per cent. of voids	25	32	44	—
Average weight per cu. ft. lbs.	102	98	84	88
Specific gravity	1.63	1.57	1.35	1.41

The concrete was mixed by hand on a plank platform adjacent to the molds. The materials for each batch were measured as above described. Sand and cement were made into a mortar, and the crushed stone and gravel spread thereon, all turned over several times by shovels, and then shoveled into the boxes, made ready adjacent to platform, and the whole was tamped in layers 6 in. thick, as shoveled in. The medium mixture was put into the box in 21 min., the dry in 25, and the wet in 23 min. The dry required and received most tamping, but the wet took nearly as long to put into mold, on account of the small amount that could be handled on each shovel. The surface of the wet mixture was the best, the medium next, and the dry the poorest. There was not enough water in the dry block to permit a finish either to the side or top and the surface could be easily abraded, and small pieces picked off by the fingers. The gravel and stone came away from the mass quite easily, and the block could not be handled to weigh it without crumbling edges and top surface.

After the blocks were finished, the surplus water on the medium and wet blocks froze; but this freezing was of short duration, as the weather grew warmer, and the water had disappeared when the blocks were weighed. They stood for about four months exposed to the weather, and were then weighed again. All had lost in weight, though it is probable that the dry piece had been abraded and its loss was partly from that cause and partly from loss of water. The wet block had lost most weight; probably, therefore, had lost more water. At the end of 10 months the blocks were broken, as before stated, and photographs were made. The texture of the medium and wet blocks is excellent, while that of the dry one is poor, not well compacted, and the surface is more easily abraded. Before breaking, the blocks were again weighed.

From the foregoing experiment, it may be safely inferred:

First. That a medium concrete, or one that has not enough surplus water to produce quaking, while having enough to permit easy and thorough ramming, is most desirable. The specification that the concrete shall not quake in the barrow, nor while handling, but that it may be wet enough to quake when heavily rammed, would seem about right for regulating the amount of water to be used.

Second. It is probably safer to have an excess than to permit a deficiency of water. Above all, however, it is of the utmost importance that the concrete shall be consolidated thoroughly by ramming.

TECHNICAL.

Manufacturing and Business.

The Chicago office of the Cleveland Pneumatic Tool Co., H. S. Covey, manager, will be moved on May 1st or before to 403 Fisher Building.

Pawling & Harnischfeger, Milwaukee, Wis., have recently booked orders for 45 electric traveling cranes and hoists. These run from five tons up to 30.

The Wellman-Seaver-Morgan Engineering Co., engineers and manufacturers, with office and works at Cleveland, Ohio, is the new name of the former concern of Wellman-Seaver Engineering Co.

The Harrison Dust Guard Co., of Toledo, Ohio, has just placed several new machines in its plant, which will enable it to nearly double the capacity for the manufacture of the Harrison dust guards.

The National Skylight & Construction Company has the contract for the first receiving station for wireless telegraphy in New York City; it is a glass house on the roof of the Chesebrough building, built on the "Rex System," steel, puttyless and fireproof glazing.

Jay G. Robinson has accepted the agency of the Washburn Coupler Company of Minneapolis, Minn., for the sale of its couplers and other railroad devices in the States of Illinois, Indiana, Michigan and Ohio. Mr. Robinson has offices in the Old Colony building, Chicago.

The following concerns have just removed their Pittsburgh offices to the Frick Building, that city: Allis-Chalmers Co., No. 1212; Brown Hoisting Machinery Co., No. 832; Niles Tool Works Co., Bement, Miles & Co., the Pond Machine Tool Co., and Pratt & Whitney Co., 1223-1224.

Henry W. Toothe has been made manager of the railroad department of the Magnolia Metal Co. Mr. Toothe was last June appointed salesman for the company, and in November made Special Sales Agent. On April 1 the railroad department was reorganized and its management put into the hands of Mr. Toothe.

Col. John T. Dickinson, who has heretofore represented the Consolidated Railway Electric Lighting & Equipment Company in Chicago, has been transferred to New York as General Agent, with headquarters at the general offices of the company, 100 Broadway, New York; and Mr. Geo. W. Carhart has succeeded Col. Dickinson as General Agent of the company in Chicago and the West.

Iron and Steel.

The Bethlehem Steel Co. on April 2 raised the wages of about 1,500 employees.

The St. Louis Iron & Machine Works has increased its capital from \$200,000 to \$500,000.

The United Engineering & Foundry Co., of Pittsburgh, Pa., is shipping 20,000 tons of steel-mill machinery to Monterey, Mexico, for the new plant at that place.

Application has been made for a charter for the Knoxville Wheel & Foundry Co., of Knoxville, Tenn., and capitalized at \$25,000. The incorporators are W. P., D. C. and A. P. Richards, W. D. Williams and C. H. Johnson.

The building of the plant proposed by the National Bridge Co. at Colonia, Pa., has been temporarily suspended owing to the death of James Kennedy, one of the leading promoters of the enterprise. The report that the project has been abandoned is denied.

The United States Steel Corporation has closed a contract with the Bessemer Furnace Association for 300,000 tons of pig iron at \$16.50 a ton, to be delivered between October and March of next year. This is 50 cents higher than the price paid for the last order placed by the Steel Corporation, but is a fraction below the present market price.

The entire plant, including furnace, ore mines, etc., of the Valentine Iron Co. at Bellefonte, Pa., has been sold to the Nittany Iron Co., a new concern composed of J. W. Gephart, L. T. Munson and Frank Clemson. The annual capacity of the works is 4,000 gross tons. Work has been begun to get the plant ready to resume about June 1.

The Portsmouth Steel Co., of Portsmouth, Ohio, has been incorporated in West Virginia, with a capital of \$300,000. This is the company composed of independent sheet mill owners who recently bought the old Burgess open-hearth plant of the Crucible Steel Co. of America. With the additions proposed, the plant will turn out about 500 tons of billets a day.

The Steel Ores Company of New York City was incorporated in New York State April 5, with a capital of \$500,000, to do a general mining and steel manufacturing business, principally in Virginia. The incorporators are: Cornelius P. Kitchel, Guthrie B. Plante, John R. Brach, Graham Sumner, Walter D. Makepeace, John T. Smith and Francis M. Clark, of New York City.

On account of the fire which recently occurred in the machine shops of the Chihuahua & Pacific Railroad, Mexico, Thomas J. Brennan, the representative of the company at 80 Broadway, New York, will be in the market shortly for woodworking machinery, belting, shafting, iron for structural work, etc., which in all will represent an expenditure of some \$12,000.

Texas Southern Construction Co.

The company has been organized by Dr. F. C. Allen, of Beatrice, Neb.; C. N. Atkinson and Edwin Holcomb. Incorporation was made under the laws of Texas, for the purpose of building railroads, and it has already secured contract to build 600 miles of road for the Kansas City, Mexico & Orient.

Oil Tanks on the Southern Pacific.

Work will soon be begun on placing the oil tanks along the lines of the Southern Pacific. Five work trains have been allowed the contractors. In all tankage to the capacity of 1,020,000 bbls. is under contract, and these figures will be doubled before the work is finished. Cody & Sons and Penman, of Beaumont, will do the work from New Orleans to San Francisco. Under the present arrangement 26 tanks will be erected, each with a capacity of 37,000 bbls., and located approximately 100 miles apart. The first work will be along the line of the Houston & Texas Central as previously mentioned. It is said that the steel is being shipped ready for bolting together.

The Standard Steel Car Co.

The Standard Steel Car Co. has announced that its new steel car plant will be built at Butler, Pa. As already mentioned in these columns, all contracts for the new works have been let, including the buildings, and much of the machinery is ready for shipment. The company has made a contract with the United States Steel Corporation for the delivery this fall of 30,000 tons of steel which will be used in the first cars to be made in the plant. It is said the company has orders for cars to the amount of about \$2,000,000. The organization of the company is as follows: President, John M. Hansen; Vice-President and Treasurer, A. R. Fraser; General Manager, J. H. Gearhart; Manager of Works, Peter F. McCool. Among the directors are Edwin Hawley, President of the Minneapolis & St. Louis, and L. C. Weir, President of the Adams Express Co.

American Locomotives in Bavaria.

Reports having been published in German newspapers and repeated in England that the four American locomotives brought to Bavaria about a year ago had needed so many repairs that they would, apparently, last not half as long as German engines, the Journal of the

German Railroad Union says that these reports are due to complete ignorance of the circumstances. The engines have given satisfactory service, and so far there has been nothing to indicate that they will not be durable. They were ordered for the purpose of ascertaining whether they had features which might profitably be adopted in the designs for locomotives ordered in Germany or elsewhere, and some peculiarities in their construction have already proved so simple and efficient that they may serve as models in specifications for new locomotives for the Bavarian State Railroads.

Rolling Stock for Siam.

The Siamese State Railroad is about to let contracts for 29 passenger cars, 4 baggage cars, 20 box cars, 20 platform cars and 5 stock cars. As the railroad was built by a German engineer, American types will probably not be acceptable.

Signaling.

The Pneumatic Signal Company has bought the Standard Signal Company of Troy. It is now designing new works for all branches of signal work. This company also owns the controlling interest in the British Pneumatic Railway Signal Company of England, which has installed the first system of automatic block signals as well as the first pneumatic interlocking system in Great Britain. That company has received further orders for eight low-pressure pneumatic interlocking plants and 31 block stations in England. Continental companies are forming to handle the various appliances. Mr. Charles Hansel has been elected Assistant to the President, with offices in New York and London. Mr. Hansel's successful work as Vice-President and General Manager of the National Switch & Signal Company is well-known, and his standing as a signal engineer is recognized at home and abroad.

Car Lighting.

The Grand Trunk Railway has recently contracted with the Safety Car Heating & Lighting Company for the equipping of 50 additional cars with the Pintsch system of lighting. The Pintsch Gas Works at Moncton, N. B., which has been in the course of construction for the past two months, is now completed, and gas is being made there for use in the cars of the Intercolonial Railway.

Steel Shop Kegs.

The Cleveland Wire Spring Co., Cleveland, Ohio, having added a sheet metal specialty department to its already large wire spring works, is now putting on the market the steel kegs shown in the illustration. They are intended for use in railroad shops to permit the handling of bolts and small parts in a more economical manner than by wooden kegs. These steel kegs can neither be broken, nor soaked with grease and be-



come a source of fire. Made of steel sheets and painted they are durable. The hoops on these kegs are made of one piece of steel, doing away with a riveted hoop. The bottoms are of a heavier gage, flanged and riveted to the body, making a neat looking receptacle. The company also manufactures pails and barrels in the same manner. Boxes, trays and hods are shown in its catalogue.

The American Car & Foundry Co.

The American Car & Foundry Co. reports for the three months ending with Feb. 28 net earnings of \$780,642, as compared with \$978,798 for the same period of 1901, a decrease of \$198,156. The company's net earnings for the first 10 months of the fiscal year, which ends April 30, were \$2,806,118, against \$3,466,025 in the corresponding period of the previous year, a decrease of \$659,907. The falling off is explained as due to the scarcity of material and the consequent decrease in output. The company now has \$12,000,000 in material on hand and steel contracts are being more promptly filled. The company is turning out material which has heretofore been contracted for with outside companies. Additions are being built to the mills in St. Louis, Detroit and Berwick, Pa. Until the working capital reaches \$15,000,000, as compared with the \$11,000,000, which the company now has, officials will not favor any increase in dividends on the common stock. The present rate is 2 per cent.

Repairing Locomotives by Schedule.

The Chicago & North Western has had in force for about nine months now a scheme of repairing locomotives by schedule, and reports it as working with entire satisfaction, and as a great improvement over the old method. It eliminates much uncertainty and enables the motive power department to know just how it may count on its engines. There are three schedules, for three different periods of time, depending upon the nature of the repairs. The longest schedule is for general repairs and half side-sheets, the total time allowed being 21 days. Next is

for general repairs, with an allowance of 16 days. Light repairs are given eight days. Each week a report is made showing the number of engines received and turned out, and the nature of repairs for each; the report also shows if any engines are delayed and the cause for such delay. Each week a meeting of the general and department foremen is held to discuss conditions. If any delays are occurring the causes are considered and an effort made to equalize the time by allowances from other departments. These shops are at present turning out 32 locomotives a month, with the expectation of bringing the number up to 35, as soon as certain improvements now being made are completed.

Chicago Track Elevation.

The Chicago City Council has passed another track elevation ordinance affecting six different railroads and 88½ miles of track. It is a mandatory ordinance, the first since 1893, and the roads are given 90 days in which to accept the plans. The roads concerned are the Chicago & North Western, 32.25 miles of track; Chicago, Burlington & Quincy, 27.93 miles; Chicago Terminal Transfer, 12.75 miles; Pittsburgh, Cincinnati, Chicago & St. Louis, 10.15 miles; Chicago Junction, 4.45 miles; Atchison, Topeka & Santa Fe, 1 mile. The territory in which the tracks lie is in the southwestern part of the city, and is bounded by Halsted street, California avenue, West Twelfth street and West Thirty-first street. A total of 28 subways will be built of which two, those at Robey and Leavitt streets, are of unusual length and will be very expensive. The Leavitt street subway will pass under 213 tracks, spaced 13 ft. center to center, making a length of 2,769 ft.; the Robey street subway will be a little shorter than this. The estimated cost of the two is in the neighborhood of half a million dollars. A refusal by the railroads to accept the plans will be based on objections to putting in both of the above subways. The estimated cost of all work covered by the ordinance is \$2,500,000, and the roads have until Dec. 31, 1908, in which to complete it.

The Railway Steel Spring Company.

The statement of the Railway Steel Spring Co., whose stock was admitted to trading on the Stock Exchange a few days ago, has been submitted to the Committee on Unlisted Securities of the Exchange. The capital stock is \$20,000,000, half common and half preferred, the latter being entitled to 7 per cent. The statement, the first ever issued by the company, shows the net earnings of the constituent companies over a period of three years to have been \$3,396,200.54. The earnings in 1899 aggregated \$1,002,182; 1900, \$1,094,452, and in 1901, \$1,299,566. The capacity of the constituent companies is given as follows:

Name and location:	Acres.	Tonnage capacity.
A. French Spg. Wks., Pittsburgh.....	1½	15,000
Chas. Scott Spg. Wks., Philadelphia.....	1½	15,000
Pickering Steel Wks., Philadelphia.....	1½	10,000
Nat. Ry. Spg. Wks., Oswego.....	7½	8,500
Detroit Steel & Spg. Wks., Detroit.....	4½	20,000
Also steel mill with capacity of.....		40,000
Ry. Spg. department of Crucible Steel Co. of Am., Pittsburgh.....		5,000

With the exception of the Detroit steel mill the capacity is all steel springs. The A. French Spring Works consist of three mills. The Charles Scott Spring Works consist of two mills. The Detroit Steel & Spring Works consists of rolling mill and spring works. All of the company's plants are now in operation with the exception of the spring department acquired from the Crucible Steel Co., which is to be dismantled and absorbed by one of the other plants of the company. The estimated monthly output of the plants now in operation is 5,708 tons of steel springs and 3,393 tons of steel. The names of the officers were given March 7, p. 166.

THE SCRAP HEAP.

Notes.

The Delaware, Lackawanna & Western, whose passengers are taken to and from New York, by the Hoboken Ferry Company, has notified the ferry company that it will withdraw from the contract at the end of this year.

On the Pittsburgh, Fort Wayne & Chicago, the station agents have been directed to refuse hereafter to store packages and hand baggage in their offices; this, it is said, is done to enable the agents to more strictly carry out the rule to admit no strangers to their offices.

The Canadian Pacific has lately adopted a new code of rules, based on the standard code of the American Railway Association, and the new code was put into effect on the Pacific Division on the first of March. The same rules will be put into effect on the Western Division on May 1, and on all the other lines of the company on June 15.

On the night of April 3, a passenger train of the Burlington Road was stopped at a point three miles north of St. Joseph, Mo., by four masked men who tried to rob the train, but who, it is said, secured nothing. This hold-up was near a place where several years ago Mr. W. C. Brown, General Manager of the Burlington, surprised and dispersed a gang of train robbers by running a dummy train ahead of the train which it was intended to rob.

The firemen of the Erie Railroad, after a long conference with the officers of the company, announce that they have been granted a material increase in pay. Similar reports are published concerning yard men on the Boston & Maine, and concerning freight trainmen and telegraph operators on the Bessemer & Lake Erie. At Pittsburgh

it is reported that the Baltimore & Ohio has granted increases to many trainmen. A local paper says: "The most radical changes of much benefit to the men are the placing of the divisions east of the Ohio River on the same wage basis with those west of the Ohio; the advance in wages of employees of the Cleveland, Lorain & Wheeling and Ohio River Railroads and the adjustment of the pay of passenger and through and local freight crews, excepting enginemen and firemen. Men on divisions east of the Ohio were receiving 10 per cent. less than those on the divisions west."

The Suez Canal Traffic.

In 1901 the number of vessels passing through the Suez Canal was 3,699, with an aggregate tonnage of 15,163,233, paying about \$20,000,000 in tolls. The largest traffic previously was in 1899—3,607 vessels and \$18,000,000 in tolls. All but 6 per cent. of the vessels passed without stopping at night, and the average time in the canal was 18 hours and 41 minutes. Those which anchored at night were 30 hours and 19 minutes in the canal, on the average. The electric lighting of the canal has thus increased the capacity of the canal about 40 per cent.

Some Belated Medals.

A railroad bridge over the Rhine at Hamm was completed in 1870, and was to be opened with a great celebration and a gathering of high officials of German and other states and leading railroad officers, in the summer of that year. As memorials of the festival a number of bronze medals, of special design, were struck, to be distributed among the guests. But before the day set for the solemn opening the war between France and Germany broke out, and trainloads of troops were despatched across the bridge at the earliest possible moment, and the celebration was not only postponed, but apparently forgotten. The other day, in a storeroom at Dusseldorf, where all sorts of useless lumber were kept, a box was noticed full of bronze medals, with portraits of King William of Prussia and consort on one side and Father Rhein, the Hamm bridge and the date 1868-70 on the other. These were the memorial medals which were to be distributed 32 years ago. They are now to be given to the older railroad employees at Dusseldorf.

Information from Germany.

The Journal of the German Railroad Union has a paragraph concerning the wages of American railroad employees, as shown by the last Inter-State Commerce report. The American reader will be startled to learn from this that station agents receive on the average 50 cents a day, locomotive engineers \$1.09, firemen 59 cents, conductors 90 cents, track-hands 33½ cents, and so on. It seems that the translator took the figures for dollars and cents and made them marks and pfennigs. In this way some labor in computing was saved, but to arrive at the truth each number must be multiplied by 4.2.

British Car Builders Combine.

It is reported that an amalgamation of interests has been effected between six well-known Midland and Lancashire car building companies. With a capital of about \$5,000,000 (a portion of which the public may be invited to subscribe) the combination takes in the following firms: Metropolitan Railway Wagon Co., Messrs. Brown & Marshalls, the Oldbury Wagon Co., Messrs. Ashbury, of Manchester, and two other Manchester builders.

London Underground "Tubes."

A specially appointed committee of the House of Lords will on Wednesday, April 16, commence sittings in London to thoroughly investigate fourteen of the underground electric railroad projects which now await Parliamentary sanction. Their respective merits as to route will be carefully considered so as to ensure the most convenient network of lines from the public point of view.

Improvements at Conneaut.

Improvements are being made at the Conneaut docks of the Bessemer & Lake Erie to prepare for the heaviest ore traffic ever handled by the road. The Pittsburgh & Conneaut Dock Company and the Bessemer & Lake Erie are co-operating in this work. An addition to dock No. 4 200 ft. long has just been completed. The road has ordered 15 switching engines for use in the Conneaut yards.

General Electric Company.

The report of the General Electric Co. for the 12 months ended March 1, shows a balance equal to 51.8 per cent. on the capital stock outstanding. The capital stock of the company on March 1 was \$24,936,300, an increase for the year of \$84,800. The balance of the company on March 1, stood at \$12,868,928, an increase as compared with the corresponding date of last year, of \$6,240,394. Taking into consideration dividends of 8 per cent., or \$1,994,400, paid on the stock, it is apparent that the earnings for the 12 months represented more than 32 per cent. on the capital stock.

To Spend \$1,600,000 for Good Roads.

Edward A. Bond, State Engineer, Albany, N. Y., will soon advertise for bids for building nearly 200 miles of roads to cost about \$1,600,000, half of which is to be borne by the State and half by the localities. In all 65 roads are to be improved during the coming year.

Results on the Government Roads in Canada.

The gross earnings of all the Government railroads in Canada for the year ending June 30, 1901, is given as \$5,213,381, an increase of \$439,219 over the preceding year. As against this, there are working expenses of \$5,738,051, an increase of \$1,073,823 over the previous year, resulting in a net loss of \$525,670. The Intercolonial; the Windsor branch, which is maintained only, and the Prince Edward Island, are the lines operated by the Government, of which the Intercolonial, being the largest road, was the heaviest loser, to the amount of \$488,186 deficit.

Value of Exports During 1901.

The Summary of Commerce and Finance published by the Treasury Department includes the following statistics for the year 1901: Total value of breadstuffs exported \$276,404,299, as against \$250,786,080 in 1900. The total value of provisions exported increased from \$186,568,735 in 1900, to \$206,931,309 in 1901. The value of cars, passenger and freight, and parts of cars for steam railroads exported during the past year was \$3,956,498, as against \$3,355,423 in 1900. For other railroads \$1,271,508 in 1901, and \$1,207,655 in 1900. Exports of cotton amounted to \$300,985,383, a decrease from \$314,252,586 in 1900. The value of iron and steel and manufactures of the same exported in 1901 was \$8,628,781 at an average price of

\$27.12 per ton. In 1900 it was \$10,895,416 at \$30.58 per ton. During 1901, 448 steam locomotives were exported at a total value of \$4,051,434, an average of \$9,043 each. In 1900 436 were exported at a value of \$4,468,527, the average price of each being \$10,249. Total exports of iron and steel during the year, excluding ore, amounted to \$102,539,797, and in 1900, \$129,633,480.

A Flood Locomotive.

"Certain railroads which are blocked at certain places by high water two or three times every year have about decided to build wading engines. Superintendent of Motive Power L. H. Turner, of the Pittsburgh & Lake Erie, is a genius, and to obviate the trouble at Saw Mill run he is about to get up a unique engine. This machine will be placed on four high wheels (driving wheels) with the fire-box so arranged that it will occupy part of the diameter of the boiler and be almost as high as the wheels, which can be made 70 in. in diameter. Mr. Turner has no plans to make public, but he admits that it could be called an amphibious locomotive. He will insist, however, that such an engine could be called with much more scientific propriety a batrachian."—*Torchlight of Civilization.*

Floating Dry Dock.

Rear Admiral Endicott, Chief of the Bureau of Yards and Docks, Navy Department, has asked bids for transporting the large floating steel dry dock bought from Spain and now at Havana, to the Philippines for use at the Olongapo Naval Station. It is still uncertain whether this dock will be taken to the Philippines or left in Cuba, but the Department desires to have a contract ready to sign in case it is decided to send the dock on so long a trip.

American Locomotives in England.

A statement appeared in a recent magazine article on the "American Invasion of Europe" that is slightly inaccurate. The statement was made that there was hardly an English line on which there were not trains drawn by American engines. This is the exact opposite of the truth, for at present there is not one American passenger engine in the United Kingdom, and the only railroads that have freight engines from the States are, the Midland, the Great Northern and the Port Talbot Dock Company in England, while there is not to my knowledge one American engine in the whole of Scotland. The illustration of a modern European express engine is of one built some 10 or more years ago and now not even the standard of the line which owns it.

Prices for Heavy Ordnance.

Heavy ordnance is not quoted in the steel market, and it has no established price in the hardware trade. The Watervliet Arsenal, however, reports the cost of the goods it manufactures, and some of the more striking figures are as follows: 12-in. breech-loading rifle, \$39,248; 10-in. breech-loading rifle, \$23,424; 8-in. breech-loading rifle, \$12,269; 6-in. rapid-fire gun, \$7,527.—*Journal of Commerce.*

New Car-Floats.

The R. Palmer & Son Ship-Building Company, of Noank, Conn., has lately built barges, car floats, etc., for the Philadelphia & Reading, the New York Central, the Erie and the Lackawanna railroads. Among the orders on which work is now in progress are the following: For New York, New Haven & Hartford Railroad, two car floats of 1,100 tons each; for the Erie Railroad, two car floats of 810 tons each; for the New York Central & Hudson River, two car floats of 1,200 tons each, and four of 810 tons each; for the Central of New Jersey, three car floats of 900 tons each; for the Manhattan Lighterage Company, six lighters, one 230 tons, one 220 tons and four of 200 tons each; for the White Star Towboat Company of New York, two tugs, one of 160 tons and the other 120 tons; for L. W. Palmer, car float of 800 tons; for the Star Transportation Company, New York, car float of 840 tons and schooner barge of 1,763 tons.

Railroad Disaster in the Transvaal.

In a train accident on March 30 near Barberton, Transvaal Colony, South Africa, 39 British soldiers were killed and 45 injured. The engineer lost control of the train on a down grade, and for three miles it went at the rate of 80 miles an hour. The engine jumped the rails at a sharp curve, with five cars filled with soldiers. A terrible smash-up followed, and the boiler of the engine exploded. The engineer and fireman were killed. Six of the 45 injured soldiers afterwards died.

Entre Amis.

We have received the second number of the little pamphlet published by the Artistic and Literary Society of officers of the Paris, Lyons & Mediterranean and other French railroads. We have before now mentioned this peculiar enterprise which is precisely what the name of the society would indicate. The pamphlet contains a few very short stories, two or three poems and a drawing or two, all by various French railroad officers. It would probably not be easy to produce anything of a like literary quality by the efforts of American railroad officers. It certainly would be hard to get them to give their time and attention to work of this sort. It is hard enough to get them to write about their profession, without bothering about literature and the arts.

Perils of Track Inspection in the Arctic Zone.

We have all seen the pictures of a pack of wolves chasing a Russian sleigh. This time it was a hand-car that the wolves chased, and the place was on the new Gellivara Railroad, in Sweden, just north of the Arctic circle. A track-hand was propelling the car in a lonely place in the woods when suddenly a pack of nine wolves leaped out of the bushes and started after him. He made all the speed possible, but was entirely exhausted when he reached a cabin on the line, where, on the appearance of several men, the wolves were frightened away.

LOCOMOTIVE BUILDING.

The Copper Range has ordered an additional engine from the American Locomotive Co.

The Belgian Government, according to press reports, will shortly call for bids for 150 locomotives.

The Boyne City & Southeastern (Michigan) has ordered a mogul from the Baldwin Works.

The Gulf & Ship Island has ordered six consolidation engines from the American Locomotive Co.

The New York Central & Hudson River is having 10 locomotives built at the Rhode Island Locomotive Works.

The Standard Steel Car Works, Pittsburgh, has ordered a locomotive from the American Locomotive Co.

The Southern has ordered 35 locomotives from the

American Locomotive Co., and 32 from the Baldwin works.

The Atlantic Coast Line has ordered three locomotives from the Baldwin Works, in addition to the four reported Jan. 3.

The Lake Erie & Detroit River has purchased three 50-ton freight engines, rebuilt at the Hicks Locomotive & Car Works.

The Terre Haute & Indianapolis is having six locomotives built at the Pittsburgh Works of the American Locomotive Co.

The St. Louis & San Francisco has ordered 30 consolidations from the Baldwin Works, and 10 from the American Locomotive Co.

The Illinois Central has ordered 22 locomotives built at the Rogers works, in addition to the 34 reported in the Railroad Gazette Dec. 13.

The Chesapeake & Ohio has ordered 25 consolidation engines from the Richmond works of the American Locomotive Co., and five Prairie type passenger engines, to be built at Schenectady. This includes the order reported Feb. 21.

The Grand Trunk will build for 1902 delivery, 35 compound mogul engines, and five simple 10-wheel engines. The moguls will weigh 163,704 lbs.; weight on drivers, 140,744 lbs.; cylinders, 22½ x 26 in. and 35 x 26 in.; drivers, 63 in. The 10-wheel engines will weigh 177,772 lbs.; weight on drivers, 132,608 lbs.; cylinders, 20 x 26 in.; drivers, 73 in. Both classes of engines will have extended wagon-top boilers, with a working steam pressure of 200 lbs. The 10-wheel engines will have a heating surface of 2,400 sq. ft.; the moguls, 1,901 sq. ft. The tubes of the 10-wheel engines will be 15 ft. long; of the moguls, 11 ft. 11 in. They will be of charcoal iron in both classes of engines, with outside diameter of 2 in. Dimensions of fire-box, both classes, 120 x 40½ in., inside measurement; grate area, 33.43 sq. ft.; tank capacity, 6,000 gal. of water, and 20,000 lbs. of coal.

The Chicago, Milwaukee & St. Paul has ordered 30 locomotives from the Baldwin Works, 15 of which will be 10-wheel freight compound, and 15 Atlantic type compound. The freight engines will weigh 176,000 lbs., with 126,500 lbs. on drivers. Cylinders, 15 x 28 in.; 62 in. drivers, wagon-top boilers, with a working steam pressure of 200 lbs.; tubes, 350 in number, 2 in. in diameter, and 15 ft. long; fire-box, 102 x 66 in.; tender capacity, 7,000 gal. of water, and 10 tons of coal. The passenger engines will weigh 175,000 lbs.; weight on drivers not to exceed 90,000 lbs.; cylinders, 15 x 28 in.; drivers, 84 in.; wagon-top boilers; working steam pressure, 200 lbs.; number of tubes, 350, 2 in. in diameter and 16 ft. 6 in. long; fire-box, 102 x 66 in.; tender capacity, 7,000 gal. of water and 10 tons of coal. The special equipment for both classes includes Westinghouse air-brakes, Coffin steel axles, Munton M. C. B. couplers, U. S. Headlight Company's headlights; Ohio injectors; U. S. Metallic piston and valve rod packing; Richardson safety valves; Leach sanding devices; Detroit sight feed lubricators; cast steel springs; McKee-Fuller tires and cast-steel wheel centers.

CAR BUILDING.

The Chicago & Alton is having a coach built at the Pullman Works.

The Southern is having 25 freights built at the Pressed Steel Works, Allegheny.

The American Car & Foundry Co. is building 27 freights at its Huntington Works for export.

The Bellingham Bay & British Columbia has purchased from F. M. Hicks one passenger coach, rebuilt.

The Shippers' Refrigerating Co. is having 15 freights built at the Illinois Car & Equipment Co., Chicago.

The Chicago, Rock Island & Pacific has ordered 28 passenger, baggage and express cars from the Pullman Co.

The St. Louis, Kansas City & Colorado is having 50 freight cars built at the St. Charles Works of the American Car & Foundry Co.

The Bessemer Coke Co., Pittsburgh, has purchased 50 hopper bottom gondolas of 80,000 lbs. capacity, rebuilt by the Hicks Locomotive & Car Works.

The Chicago, Rock Island & Pacific and the Southern Pacific have ordered jointly nine solid passenger trains, making a total of from 70 to 80 cars, from the Pullman Co., to be used on the Rock Island-California, Limited.

The St. Louis & San Francisco has ordered from the St. Charles Works of the American Car & Foundry Co., 100 40-ft. flat cars for June delivery. The special equipment includes American Steel Foundry Company's bolsters, Sterlingworth brake-beams, Trojan couplers and Miner draft rigging.

The Grand Trunk has ordered 100 coal cars for August delivery, in addition to the 300 flat cars reported last week. The coal cars will be of 80,000 lbs. capacity; weight, 36,200 lbs.; length, 38 ft.; width, 9 ft. 1 in.; height of sides, 4 ft. 2½ in., to be built of wood. The flat cars will be of 60,000 lbs. capacity; length, 36 ft. 9¾ in., and width, 9 ft. ¾ in.; material, wood.

The Seaboard Air Line order with the Southern Car & Foundry Co., mentioned in our issue of Dec. 27, calls for 500 box cars of 60,000 lbs. capacity. These cars will be 36 ft. long, 8 ft. 6 in. wide and 7 ft. 6 in. high, all inside measurements. Special equipment includes steel I-beam bolsters, cast-iron brake-shoes, Westinghouse air-brakes, Ajax brasses, Tower couplers, Jones doors, malleable iron journal boxes, Chicago-Cleveland roofs, and 33 in. cast-iron wheels.

The Canadian Pacific order with Rhodes, Curry & Co. for 500 box cars for fall delivery, reported last week, includes the following specifications: Capacity of cars, 80,000 lbs.; length, 36 ft. inside; width, 8 ft. 6 in. inside; height, 7 ft. 6 in. at carline; 7 ft. 8 in. at center, cars to be built of wood with Simplex bolsters, Sterlingworth brake-shoes, springs and wheels; Westinghouse air-brakes, St. Thomas Brass Co., brasses, Tower couplers, Jones door fastenings, Miller grain doors, Miner draft rigging and Chicago-Winslow improved roofs.

BRIDGE BUILDING.

ALLEGHENY, PA.—On April 5 the House of Representatives passed a bill authorizing the Western Bridge Co. to build a bridge across the Ohio River at Allegheny, Pa. The promoters of the undertaking are John Murphy, General Superintendent of the Pittsburgh Railways Co.; S. LaRue Tone, for the Philadelphia Company, and R. F.

Ramsey, formerly Secretary of the Pleasant Valley Street Railway.

ANNAPOLIS, MD.—The County Commissioners want bids until April 22 for building a bridge over the Patuxent River between Anne Arundel and Prince George's Counties, to replace the old Governor's bridge. Chas. Himelheber, Clerk.

ARKANSAS.—The U. S. Senate on April 2 passed the bill authorizing the White River Ry. to build a bridge across White River, in Arkansas. (March 21, p. 215.)

ATLANTA, GA.—The County Commissioners have decided to build a steel bridge at Race's Ferry, 10 miles northeast of Atlanta. The cost will be about \$8,000, part of which will be paid by Cobb County.

BALTIMORE, MD.—The County Commissioners of Anne Arundel and Baltimore Counties are considering building a bridge over the Patapsco River at Sweetzer's Ridge, about four miles from Baltimore City. The cost of a steel bridge is estimated at \$12,000, and a wooden structure at \$4,000. Samuel Brook is one of the Commissioners from Baltimore County.

BERTRAND, MICH.—The contract for the steel bridge across St. Joseph River, between Bertrand and Niles, has been let to the Elkhart Bridge Co., of Elkhart, Ind.

BOSTON, MASS.—The City Engineer writes us that part of the masonry piers for the Broadway bridge, the plans of which were recently approved by the Secretary of War, are let. The steel superstructure and the remaining piers will be let as soon as plans and specifications are ready. It is a center pier drawbridge with a 50-ft. channel on either side of the center pier, in Fort Point Channel.

BUFFALO, N. Y.—The Aldermanic Committee of the Council is considering bills for a bridge across Scajaquada Creek in Sprenger street, to cost about \$7,000, and for a bridge across Cazenovia Creek to replace the bridge in South Park avenue, at a cost of about \$36,000.

The International Traction Co. has asked the city for permission to lay its tracks on the new bridge over Buffalo River. The city wants the company to strengthen or rebuild the structure.

CAPITOL, MONT.—The County Clerk at Miles City, Mont., will receive bids until April 23 for a 110 ft. combination bridge over Little Missouri River. George Scheetz, County Surveyor.

CARTHAGE, TENN.—According to report, from Carthage, the storm has destroyed the Nashville & Knoxville bridge over the Cumberland at Lancaster.

CHICAGO, ILL.—See "Chicago Track Elevation" under Technical.

CLEVELAND, OHIO.—The Board of Control has approved a \$300,000 bond issue for a low level bridge from Clark avenue to East Clark avenue. The roads crossed are the W. & L. E. T. & V., and C. L. & W. The entire work will cost about \$1,000,000.

CINCINNATI, OHIO.—The County Commissioners are considering the advisability of rebuilding the bridge over Big Miami River. It will cost about \$100,000.

COLUMBUS, GA.—A bill was introduced in the U. S. Senate and House of Representatives last week authorizing a bridge across the Chattahoochee River between Columbus, Ga., and Euftaula, Ala.

COLUMBUS, OHIO.—According to local reports, the County Commissioners and the representatives of the railroad companies have agreed upon building the viaduct over the railroad tracks on Cleveland avenue. County Engineer Maetzell is making plans.

The Urbana, Mechanicsburg & Columbus Interurban road is considering with the County Commissioners plans to cross Hayden's Run bridge. The county is about to build a new bridge at this point, for which \$100,000 worth of bonds have just been sold. The Commissioners consented to let the road lay its tracks on the bridge on condition that it pay 20 per cent. of the cost. It is said that if the tracks go on the bridge, it will have to be widened considerably and will mean an additional cost of about \$25,000.

DAYTON, OHIO.—Frank M. Turner, City Civil Engineer, has submitted estimates of plate girder and concrete bridges in contemplation of a bond issue. The estimates are as follows: Plate girder bridges, Main street, \$120,000; Third street, \$259,868; concrete bridges, Main street, \$134,820; Third street, \$309,770.

DENNISON, OHIO.—Bids are wanted April 18 by the County Commissioners at New Philadelphia for a stone arch bridge over Little Stillwater Creek at the west end of Center street. The plans are on file with the County Auditor, C. C. Fennell. The estimate of cost is \$14,000 and bids will also be received on any other plans.

DES MOINES, IOWA.—According to local reports the Des Moines viaduct bill has been passed by both branches of the State Legislature and now awaits the signature of the Governor.

DETROIT, MICH.—At the general election next fall the city of Detroit will vote on a proposition to authorize the Common Council to issue bonds in a sum not to exceed \$600,000, to build a new bridge to Belle Isle. A bill was passed by the last Legislature authorizing a new bridge over the American channel of the Detroit River.

FISHKILL, N. Y.—The Highway Commissioners will receive bids until noon of April 14 for an additional steel truss to the bridge across Fishkill Creek in the village of Matteawan. W. R. Scofield, Engineer in charge.

FLORIDA.—A bill was introduced in the House of Representatives March 31 authorizing the United States & West Indies R. R. and Steamship Co. of Florida, to build a bridge across the Manatee River, in Florida.

FORSYTH, GA.—Bids are wanted April 15, according to report, for two steel bridges. E. H. Walker, Chairman of the Board of County Commissioners.

FORT DODGE, IOWA.—It is reported that the contracts will be let soon for the steel bridges to be built by the Chicago Great Western on the new line to Omaha.

GIRARD, OHIO.—The County Commissioners are considering building a viaduct at Liberty street.

HAMILTON, ONT.—Robert McCallum, Chief Engineer Ontario Public Works Department, Toronto, is making plans for the Stoney Creek bridge near Hamilton.

HARRISBURG, PA.—An officer of the Harrisburg Bridge Co. writes that definite plans have not yet been made to repair its "camel back" bridge over the Susquehanna. He says that bids have not been asked.

HARRISON, W. VA.—The Garrett Coal Co., which owns extensive coal lands in Garrett County, Md., opposite this

city, will build a steel bridge over the Potomac River at Harrison.

HELENA, MONT.—The County Commissioners are considering a site for a bridge proposed over the Missouri River either at Bear Tooth or at Craig.

INDIANAPOLIS, IND.—The County Commissioners want bids May 1 on four bridges in Pike Township. Two will be steel and two either stone, or concrete and steel. Harry B. Smith, County Auditor.

KINGSTON, N. Y.—On the night of April 1 the iron bridge 200 ft. long, which spans the roadway at Whiteport, was blown up by dynamite. The bridge is owned by the Consolidated Rosendale Cement Co.

LONDON, ONT.—A concrete and steel bridge to cost about \$3,500 will be built at Clandeboye.

MADISON, NEB.—Bids are wanted April 22, according to report, for all bridge work in this county in 1902. Emil Winter, County Clerk.

MANSFIELD, PA.—At the last meeting of the Council reports were made by the Streets and Bridges Committee on the matter of a new bridge and abutments on Academy street over Corey Creek and for a larger waterway under Main street.

MEXICO.—The Mexican National Ry. is reported to have given out specifications for a lot of bridge work. The contracts will be let by Gaston C. Raoul, Purchasing Agent, New York City.

MIDDLETOWN, OHIO.—F. A. Little, Chief State Engineer, has been in Middletown recently to arrange for the building of a bridge for the M. & C. R. R., which is to cross the canal below Sixth street.

MONTREAL, QUE.—The Montreal Bridge Company's bill asking for a five-year extension of time in which to build a bridge which was granted in 1890, and on which \$50,000 has already been spent, has been refused by the Railway Committee of the House of Commons. There is another application before the House of Commons for permission to bridge the St. Lawrence.

NEWBURYPORT, MASS.—A county officer writes that the following bids were received April 5 for the bridge over Merrimac River at Newburyport: N. E. Structural Co., Boston, \$304,720; Oswego Bridge Co., Oswego, N. Y., \$311,340; United Construction Co., Albany, N. Y., \$302,340; Boston Bridge Works, Boston, Mass., \$295,361; Eastern Bridge & Structural Co., Worcester, Mass., \$304,970; Phoenix Bridge Co., \$307,000; King Bridge Co., \$229,800; Riter-Conley Mfg. Co., \$317,200. The contract has not been let as the bids exceed the appropriation, \$200,000.

NEW YORK, N. Y.—The Mayor has accepted the bill which authorizes the finishing of the bridge over Bronx River at Westchester avenue.

OHIO, MO.—W. A. Ingram, of this place, writes us that a 200 ft. steel bridge will be built over Big Monogaw Creek.

OTTAWA, ONT.—The Government has been asked to build a bridge across the Rideau Canal at Concession street at a cost of about \$12,500.

PARKVILLE, MO.—The House of Representatives on April 5 passed the bill, previously passed by the U. S. Senate, authorizing the Kansas City, Northeastern & Gulf R. R. to build a bridge across the Missouri River at Parkville, Mo. (March 21, p. 215.)

PEN ARGYL, PA.—Plans are being made, according to report, for a bridge over Delaware River for the Northampton R. R. W. J. Young, Chief Engineer.

PERTH AMBOY, N. J.—The Board of Freeholders has adopted a resolution to have plans and specifications made, as well as an estimate of the cost, for a new bridge over Raritan River between Perth Amboy and South Amboy. This project has been before the Board of Freeholders for 10 years past. Geo. J. Haney, Freeholder.

PLATTSBURGH, N. Y.—Plans have been made by the Midland Bridge Co. of Kansas City, Mo., for the pontoon bridge to be built across the Missouri River at Plattsburgh. The cost will be about \$15,000, and Tom. E. Parnele, Mayor of Plattsburgh, is organizing a company to build it. The structure will be about 800 ft. long and 20 ft. wide, with a 16-ft. roadway.

PORTAGE, N. Y.—An officer of the Erie R. R. writes that the design for the new viaduct to be built at Portage has not yet been finally decided upon.

PROVIDENCE, R. I.—Otis F. Clapp, City Engineer, in his annual report for the year ended Jan. 1, 1902, says that revised estimates have been made for a new bridge over the Woonasquatucket River in the line of Egan street.

Revised estimates have also been made for a viaduct starting from Weybosset bridge and gradually rising over the open spaces at the Crawford street bridge, then turning and passing over South Water street and through Crawford street and over South Main street, and then through private property to Benefit street opposite Benevolent street.

Plans and estimates have been prepared for a new steel bridge to replace the present wooden one over the West River in the line of Branch avenue.

QUINCY, ILL.—A bill is before Congress authorizing the Quincy Railroad & Bridge Co. to rebuild the draw span of its bridge across the Mississippi River at this place.

RACINE, WIS.—P. H. Connolly, City Engineer, writes us that the \$60,000 bridge bond issue was defeated at the election April 1.

READING, PA.—Viewers have been appointed to consider the advisability of rebuilding the bridge over Schuylkill River at Cross Keys, several miles above Reading.

ROCHESTER, N. Y.—In regard to the proposed bridge at Vincent street, we are told that it will probably be a concrete-steel bridge, but nothing has been done in regard to getting bids as the money is not available. The bridge is located over the Genesee River between the two falls, and the distance from water to grade exceeds 100 ft. See also Buffalo, Rochester & Pittsburgh in Railroad Construction column.

SAGINAW, MICH.—A contract for the Scherzer rolling lift bridge over Saginaw River at Genesee street has been let to the National Bridge Co. at \$184,000.

SALIDA, OHIO.—The County Commissioners propose to build an iron bridge across the Chagrin River in this city.

SAVANNAH, GA.—An officer of the Seaboard Air Line writes that no plans have yet been made, nor has any location been selected for the proposed bridge of the Georgia & Alabama Terminal Co., over Savannah River to

connect the city with Hutchinson's Island. A bill has passed both houses of Congress and, according to local report, the City Council has approved the project.

SHERIDAN, MONT.—It is said that the County Commissioners will soon want bids for a steel bridge over Madison River.

SOREL, QUE.—The Quebec Southern Ry. will build the following bridges: Bridge over St. Francis River 19 miles from Sorel; a steel structure already let to the Dominion Bridge Co.; bridge over the Nicolet 33 miles from Sorel, substructure built and bids for a five-span steel superstructure now being received; Becancour River bridge 45 miles from Sorel, bids for a steel structure of four 130-ft. spans now being received; Gentilly River bridge 110 ft. single span, and Orignan River bridge 63 miles from Sorel of four 130-ft. spans, bids also being received; Grand River bridge, six spans, and Little River Duchesne of three spans, both of steel, for which bids are also being received, and a bridge over the Chaudiere of three steel spans.

SOUTH BERWICK, ME.—Bids are wanted April 22, according to report, for a steel highway bridge. James W. Hobbs, Chairman, Board of Selectmen.

SPOKANE, WASH.—The County Commissioners are reported to have taken definite action to pay one-third of the cost of a new bridge to be built over Latah Creek in place of the wooden structure. The cost to the county will be \$12,000.

STREUBENVILLE, OHIO.—The severe storm on March 30 destroyed a large structural ore bridge at the National Bridge Company's works at Mingo Junction, causing damage to the extent of about \$50,000.

STRUTHERS, OHIO.—The Youngstown Iron Sheet & Tube Co. is reported to have made arrangements to build a bridge from the public highway into its property near Struthers. The bridge, it is said, will span about 30 railroad tracks.

SYDNEY, CAPE BRETON.—The Dominion Parliament has passed the bill incorporating the Strait of Canso Bridge Co., with a capital of \$5,000,000. R. J. Reid is the chief promoter. The bridge proposed is to be at or near McMillan's Point, Port Hastings.

TACOMA, WASH.—The County Commissioners are considering the application of the Tacoma & Seattle Interurban Ry. for a bridge over Puyallup avenue.

WASHINGTON, C. IL., OHIO.—Bids are wanted April 22, according to report, for a bridge over Sugar Creek. John Craig, County Auditor.

WASHINGTON, D. C.—By an amendment to the Sundry Civil Appropriation bill proposed in the U. S. Senate, \$100,000 is appropriated to begin building the memorial bridge across the Potomac River, from a point at or near the old Naval Observatory grounds to a point on the Arlington estate. The limit of cost of the bridge is to be \$5,000,000, and it is to be built under the direction of the Secretary of War, and the location and plans are to be in accordance with the plans of the Park Commission.

WATERVLIET, N. Y.—Repairs to cost about \$15,000 are proposed to the Fourteenth street bridge.

WILLIAMSPORT, PA.—The County Court has set aside the report of the March Grand Jury for a new bridge over Muncy Creek between Hughesville and Picture Rocks, to be built on the site of the old wooden bridge. It will be taken up by the June term of the Grand Jury.

WINNIPEG, MAN.—Z. Malhot, of the Dominion Public Works Department, has been making surveys for a new bridge at St. Jean.

ZANESVILLE, OHIO.—Bids will be received until April 28 for building the superstructure of two steel bridges across Jonathan Creek, on Roseville road. George B. Hibbs, County Auditor.

Other Structures.

ASHLAND, WIS.—The Wisconsin Central, according to report, has announced that the work of renewing the big ore docks at Ashland will be begun in the fall. An additional capacity of 40,000 tons is planned.

BOONVILLE, MO.—The Missouri, Kansas & Texas will build a pressed brick station in this city at a cost of about \$20,000.

BRISTOL, TENN.—The Norfolk & Western will build a new passenger station in Bristol, but we are told that the details are not yet decided upon.

BUYRUS, OHIO.—The Toledo & Ohio Central Ry. is to make improvements to its repair shops at this place. A building 200 x 80 ft. will be built for a wood working shop, and the present wood working shop will be used as an addition to the machine shop. New machinery will be added.

CLEVELAND, OHIO.—The Bouden Foundry Co. is negotiating for a site on which to build a foundry and machine shop.

DONORA, PA.—The Union Steel Co. is reported to have let a contract to the Mackintosh-Hemphill Co., of Pittsburgh, for a new blooming mill.

EAST ST. LOUIS, ILL.—The East St. Louis & Suburban Ry. is reported to have let a contract for a new power house in East St. Louis which will cost, with machinery and ground, about \$500,000. There will also be a machine shop and car sheds 600 x 750 ft., of brick and steel, engine and boiler houses, 275 x 175 ft., and coal conveyors.

FLOMATON, FLA.—The Louisville & Nashville will replace its station and hotel here, recently destroyed, with a new two-story brick building estimated to cost \$22,000. Further improvements at this place will consist of building elevated coal sleds and bins, with a capacity of 15,000 tons.

GENEVA, N. Y.—It is announced that the New York Central & Hudson River R. R. will build a new station in this town at a cost of about \$20,000.

KANSAS CITY, MO.—According to local report, the Kansas City architect who is making plans for the new union passenger station, has finished the preliminary plans.

LITTLE ROCK, ARK.—The Choctaw, Oklahoma & Gulf will build new shops in North Little Rock, but we are told that the exact location has not been decided upon.

MINNEAPOLIS, MINN.—The Wisconsin Central, according to report, will make some additions to the capacity of its Boom Island terminals this summer.

MONTREAL, QUE.—It is said that the plans for the new Canadian Pacific shops are about finished and that bids will be asked soon.

NEW CASTLE, PA.—The Pennsylvania Engineering Co., of this city, according to report, will make some extensive improvements. A contract has been let to the American Bridge Co. for a new boiler house which will be 300 x 64 ft. The company recently increased its capital stock by \$500,000.

NEW SOUTH WALES.—The New South Wales Minister of Works has approved the plans for a new depot for the Central Railway, Sydney, which it is reported will mean the expenditure of between \$2,000,000 and \$2,500,000.

NEW YORK, N. Y.—Steps are being taken to rebuild the 71st Regiment Armory. The Governor has signed a bill appropriating \$60,000 to replace the State property.

NILES, OHIO.—The Empire Iron & Steel Co. has been incorporated with capital stock of \$200,000 to build a sheet mill at Niles. The incorporators are W. A. Taylor, John O'Dea, Charles S. Thompson, D. Strickland, W. H. Smiley. The contract for the buildings has been let to the American Bridge Co.

The Niles Sheet Metal Lath Co. has been incorporated with \$200,000 capital to operate a plant for the manufacture of sheet metal lath. Incorporators are: W. A. Taylor, C. S. Thompson, W. T. Holzbach, F. W. Stillwagon, John O'Dea. This plant will be operated in connection with the Empire Iron & Steel Co., mentioned above.

PITTSBURGH, PA.—Mr. Schwab, President of the U. S. Steel Corporation, is reported by a Pittsburgh newspaper as having told a number of the Pittsburgh members of the corporation that the improvements contemplated in the plants would be unusually large, and especially in the Pittsburgh district. The plans for the building of the tube works in Conneaut, Ohio, are said to have been fully decided upon. It was also stated that the tube works would be strengthened by the building of new blast furnaces. The new tube plant, it is said, will not interfere with the existing plants in McKeesport, but that the older ones will be enlarged. It is said to have been found impracticable to make enlargements in McKeesport on a scale that was desired.

PORTSMOUTH, VA.—An officer of the Norfolk & Western writes that new shops will be built at Portsmouth, but that the details have not yet been decided upon.

RAVENNA, OHIO.—The American Foundry & Machine Co. will build a plant here, the machine shop to be 131 by 121 ft., the foundry 122 by 75 ft., supply shop 120 by 75 ft. The company will make rock crushers and mining machinery.

SALT LAKE CITY, UTAH.—The Oregon Short Line has not yet decided on a location for its proposed new union station in Salt Lake City.

SAN BERNARDINO, CAL.—It is reported that the contract for building the Santa Fe shops at San Bernardino has been let to B. Lantry Sons at \$107,000.

SAN FRANCISCO, CAL.—According to reports, ground has been broken at Point Richmond for the new machine shops of the Santa Fe System.

SCHENECTADY, N. Y.—The contract for the Delaware & Hudson freight house in Schenectady has been let to John Dyer, Jr., of Albany. The building is a one-story structure, with concrete foundations and brick walls, 350 ft. long and 40 ft. wide.

SCRANTON, PA.—An officer of the Delaware, Lackawanna & Western writes that the company has not decided in regard to the erection of shops at Scranton.

SEATTLE, WASH.—The Globe Navigation Co. of this city will build a large dock and warehouse at a cost of about \$100,000.

SHARON, PA.—The Sharon Hoop Co., of South Sharon, has awarded a contract to the Columbia Bridge Co., of Carnegie, for a large open-hearth furnace plant. The contract also calls for two buildings, each about 200 ft. long and 75 ft. wide. Besides, there will be several smaller buildings. The plant will consist of four open-hearth basic furnaces of 2,500 tons each, which will give the hoop company an independent supply of steel. The company also intends to build several finishing mills.

SPENCER, N. C.—The Southern Ry. will enlarge its machine shops, roundhouse and car sheds at Spencer.

SPRINGFIELD, OHIO.—The plant of the S. M. Kelley Mfg. Co. will be removed to South Milwaukee, Wis. Plans are being made for the plant, which will include a foundry, machine shop, boiler house, power plant and other buildings.

ST. LAURENT, QUE.—Bids are wanted until April 18 by Fred. Gelinas, Secretary of the Department of Public Works at Ottawa, for building the extension to the wharf at St. Laurent, Isle d'Orleans.

ST. PAUL, MINN.—A new armory is proposed in this city at a cost of about \$99,500.

TUSCUMBIA, ALA.—The Southern Ry. will build a large electric plant at its new shops in this place.

UTICA, N. Y.—It is said that Reed & Stem, architects of St. Paul, Minn., are to make the plans for the new railroad station for Utica, for the New York Central & Hudson River R. R. It is further said that the structure will be brick and stone and cost about \$300,000.

WHEELING, W. VA.—The Wheeling Board of Trade is considering several projects for new industries in this city. The Wheeling, Waynesburg & Eastern R. R. is negotiating for terminal facilities. The New Industry Committee of the Board of Trade reports that it is looking for sites available for a power building 100 x 120 ft., and that if the proper site can be secured, there is no doubt that the company will be organized at once.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page six.)

Canadian Society of Civil Engineers.

At the meeting on April 10, at 8 p.m., in Montreal, a paper was read by Dr. E. G. Coker on "The Measurement of Water by a Small Venturi Meter." A discussion was held on Mr. Davis' paper on "Competition of Steam vs. Electric Parallels."

New York Railroad Club.

Next club meeting will be held at 349 Madison avenue, New York City, 8 p.m., Thursday, April 17th. Subject, "Maximum Trains; Their Relation to Track, Motive Power and Traffic," paper by E. E. R. Tratman, editor *Engineering News*.

New England Railroad Club.

A regular meeting was held at Pierce Hall, Copley Square, Boston, Tuesday, April 8, at 8 p.m. The subject was "The Work of the Railway Blacksmith—Metals, Methods, and Tools Used," with paper by Mr. Matthew Burns, of the Boston & Maine R. R. Edward L. Jaynes, Secretary, has changed his address to Back Bay post office, Boston, Mass.

Richmond Railroad Club.

A regular monthly meeting of the Richmond Railroad Club was held at the rooms of Railroad Y. M. C. Association, Main Street Station, April 10, at 8 o'clock p.m. The subjects discussed were: Standard Train Orders—The opinion as to the good and bad features of orders running a train so much late as compared with orders instructing trains to wait at a designated point until a specified time. By Mr. C. H. Hix, Superintendent, S. A. L. Ry.; paper on the organization of the Air-Brake Department, by Mr. Robert Burgess, of the Westinghouse Air-Brake Co.

The American Railway Association.

The spring session of the American Railway Association will be held at the Waldorf-Astoria, Fifth avenue and Thirty-third street, New York City, on Wednesday, April 23, at 11 a. m. Reports will be presented by the following committees: Executive Committee, Committee on Train Rules, Committee on Car Service, Committee on Safety Appliances, Committee on Nominations, Committee on Standard Dimensions of Box Cars and the Committee on Statistical Inquiry. The annual election of officers, a president and two vice-presidents, will take place at this meeting. Two members of the Executive Committee, three members of the Committee on Train Rules, and three members of the Committee on Nominations are to be elected. W. F. Allen, Secretary, 24 Park place, New York.

International Association of Municipal Electricians.

The seventh annual convention will be held at Richmond, Va., Tuesday, Wednesday and Thursday, October 7, 8 and 9. The following papers will be presented: "Municipal Inspection, and Control," Walter M. Petty, Rutherford, N. J.; "Relation of Electrical Interests to Other Branches of the Municipality," Capt. Wm. Brophy, Boston, Mass.; "Classifying of Records of Electrical Departments, and Standard Specifications, for Supplies and Contracts," Edw. F. Schurig, Omaha, Neb.; "Report of Committee on Rules for Electrical Inspection and Control," especially with reference to the occupancy of streets, Morris W. Mead, Pittsburgh, Pa.; "Joint Use of Conduits," Chas. F. Hopewell, Cambridge, Mass.; "The Telephone Service in Connection with Fire and Police Signal Systems," Jerry Murphy, Cleveland, Ohio; "Electrical Government in Small Cities," A. S. Hatch, Detroit, Mich. In addition to the papers, Mr. Hopewell, of Cambridge, Mass., will give his "Illustrated Lecture" of Fire and Police Telegraphs.

The Electric Club.

A club, having the above name, was organized by apprentices and members of the testing and engineering departments of the Westinghouse Electric & Manufacturing Co., in Hammett Hall, Wilkesburg, Pa., on March 19. The purposes of the club are stated in the constitution, as being "social recreation, mutual benefit and improvement, and more particularly the dissemination of electrical and engineering knowledge among its members. Reading rooms, class instruction, small societies or sections for the presentation and discussion of electrical and engineering subjects, general lectures by engineers and by others connected with the company, and by visitors, excursions to places of interest in and around Pittsburgh, and the encouragement of social intercourse among its members, will be within the scope of the club." The dues of the club will be \$6.00 a year. Engineering apprentices will be admitted for \$3.00 a year, and three or four year apprentices for \$1.50 a year. The officers are: E. M. Olin, President; E. D. Townsend, Vice-President; C. E. Downton, Secretary, and L. A. Osborne, Treasurer. The club starts with 150 charter members, and since March 19 the membership has nearly doubled.

PERSONAL.

—Mr. James Harding, for many years Secretary of the Missouri Board of Railroad & Warehouse Commissioners, died at Jefferson City, Mo., April 4, aged 72 years.

—Mr. J. C. O. Morse was on March 31 elected a member of the State Board of Railroad Commissioners of Kansas for the term of three years, beginning April 1, last, succeeding D. W. Finney.

—Capt. Christopher Columbus Wolcott, Civil Engineer U. S. Navy, died at the Naval Hospital, New York, on April 4. Capt. Wolcott was appointed to the Navy from New York in October, 1881, and was next in rank to Rear Admiral Endicott, the senior member of the Corps.

—Mr. Frank P. Sargent, Chief of the Brotherhood of Locomotive Firemen, has been appointed by President Roosevelt Commissioner-General of Immigration, to succeed Mr. T. V. Powderly. Mr. Sargent has accepted, but the date on which he will assume his duties has not been definitely decided.

—Mr. John A. Chaudler, General Agent of the Chicago, Milwaukee & St. Paul at St. Paul, died March 31, aged 71 years. He had been continuously in the service of this company for 49 years, starting as a clerk on the Milwaukee & Mississippi, now a part of the Chicago, Milwaukee & St. Paul. Mr. Chaudler was born at Randolph, Vt., Jan. 17, 1831.

—Mr. A. H. Westfall, General Superintendent of the Elgin, Joliet & Eastern, was born in Milwaukee, Wis., in 1861, and entered railroad service as agent at Lake Station, Wis., on the Chicago, Milwaukee & St. Paul in 1879. For two years (1882-1884) he was an operator, later becoming train despatcher. He was appointed chief train despatcher of the company he is now connected with in 1888. In 1899 he became Assistant Superintendent of the Chicago, Lake Shore & Eastern and assumed the General Superintendency of the Elgin, Joliet & Eastern in March last.

—Mr. J. M. Daly, for several months past General Manager of the Cape Breton at Port Hawkesbury, N. S., has returned to the Illinois Central, as Superintendent of Transportation. Mr. Daly was in the car record office of certain Western roads for several years, and in September, 1892, was appointed to the Superintendency of Transportation of the Illinois Central, with which road he was connected for many years. From there he went in 1899 to the Delaware, Lackawanna & Western, whence he went a year later to New Brunswick. Mr. Daly was born at Peoria, Ill., in 1860, and his railroad service dates from 1874, when he began as a clerk in the car accountant's office of the Toledo, Peoria & Western.

—Mr. J. J. Cotter, Superintendent of the First Division of the Denver & Rio Grande, is a native of McLean County, Ill. He learned telegraphing at Towanda on the Chicago & Alton, where his father was located as section foreman for a number of years. After working at almost all of the stations in Illinois for this company Mr. Cotter was promoted, in 1883, to be train despatcher at Roodhouse, Ill. Three years later he went with the Wabash in a similar capacity, and in 1888 assumed the same duties for the Missouri Pacific at Little Rock. He later returned to the Wabash and remained there until 1901, when he became trainmaster, from which position he was promoted to that above stated, Division Superintendent of the Denver & Rio Grande.

—Mr. Henry A. Bishop, the late Purchasing Agent of the New York, New Haven & Hartford, who is to become Vice-President of a Southern road, was the guest of honor at a dinner at the Quinpiack Club at New Haven on the evening of April 3, when about 100 officers of the New York, New Haven & Hartford joined in giving him a farewell dinner. Mr. Bishop was presented with a testimonial on parchment framed in gold. According to the New Haven *Evening Register* the New Haven railroad, on the evening in question, had to "run by its own momentum," the officers being all at the dinner. From a cursory examination of the list of persons present we judge that this statement is pretty nearly true. Mr. Bishop's list of friends on the road must be identical with the official roster of the company.

—Mr. W. D. Lee, who in March last assumed the Superintendency of the Rio Grande Southern, was born in Marysville, Union County, Ohio, in 1847. Mr. Lee's railroad service dates from 1874, when he began as a fireman on the St. Louis & Iron Mountain. Four years later he became Engineer. He left the service of this company in 1881, going to Colorado, and in September of the same year became Engineer of the Denver & Rio Grande, later becoming traveling engineer, and filled that position until 1891, when he was appointed foreman of machinery and rolling stock for the Rio Grande Southern. The following year he became Assistant Superintendent and later Superintendent. In July, 1900, he was transferred to the Denver & Rio Grande as Assistant Superintendent, but returned to the Rio Grande Southern in 1902 as Superintendent at Ridgway.

—Mr. J. M. Hannaford, who recently assumed the Second Vice-Presidency of the Northern Pacific, was for two years previous the Third Vice-President. Mr. Hannaford is 52 years old, having been born at Claremont, N. H., in 1850. His first service was with the Vermont Central as a clerk in the general freight office. This was in 1866. Mr. Hannaford's service with the Northern Pacific dates from May, 1872. Starting as a chief clerk he subsequently was made Assistant General Freight and Passenger Agent, General Freight Agent (Eastern Division), Assistant Superintendent of Freight Traffic, General Freight Agent of main line and branches, Traffic Manager and General Traffic Manager. From 1890 to 1893 he was also General Traffic Manager of the Wisconsin Central, during its lease to the Northern Pacific, and in 1899 became the Third Vice-President of the Northern Pacific and assumed his duties, as above, on March 31 last. Mr. Hannaford was at one time General Superintendent and Vice-President of the Northern Pacific Express Company. As will be seen nearly the whole of his career has been with the Northern Pacific.

—Mr. J. H. Abbott, who recently succeeded Mr. Hannon as Division Engineer of the Baltimore & Ohio, was born in Dorchester, Mass., in 1856. He was educated in the Chickering Institute and the Cincinnati University. Mr. Abbott began as a mileage clerk on the Cincinnati Southern in 1880, and for four years (1880-1884) was rodman, inspector and clerk on the Queen & Crescent. Then for six months was masonry inspector on the Louisville & Nashville. In 1885 he became Chief Engineer of the East Florida & Atlantic, then Superintendent and finally General Manager. This road was later absorbed by the Florida Central & Peninsular. For one year he was a Mechanical Engineer and Draftsman for the Knowles Loom Works, returning to the railroad service in 1894. For two years, 1896 to 1898, he was Chief Engineer of the Cleveland & Southwestern, Indianapolis Southern and other minor surveys, and was for about one year Mechanical Engineer for the Cleveland Frog & Crossing Company. The following year (1899) he returned to the Cleveland, Lorain & Wheeling as Assistant Engineer, later becoming rodmaster and finally became Division Engineer of the Baltimore & Ohio. In 1884 Mr. Abbott wrote several articles on "Railroad Organization," which were published in the *Railroad Gazette*.

—The new General Superintendent of the New York Division of the Baltimore & Ohio at New York City, Mr. Clifford Stanley Sims, is a native of Arkansas, having been born at Prairie Ridge Plantation in 1868. He was graduated from Mount Holly, New Jersey, in 1885, and his railroad career dates from that time. He began as a chairman on the Pennsylvania Schuylkill Valley. He then held a clerical position on the Pennsylvania Railroad, and after various minor engineering positions, in 1890 he became Assistant Engineer of Maintenance of Way of the Western Division of the Pennsylvania Lines West of Pittsburgh. In May, 1895, he was transferred to the Toledo Division as Engineer of Maintenance of Way; the duties of which he discharged until 1896. From 1899 to 1901 he held a similar position on the Chicago Terminal Division, and in March, 1901, became Acting Superintendent of the same Division, and the following October assumed the Superintendency. Mr. Sims is Chairman of the Committee on Yards and Terminals of the American Railway Engineering and Maintenance of Way Association, also Vice-President of the Chicago Association of General Superintendents.

—Mr. Richard S. Buck has resigned the position of Principal Assistant Engineer of the Department of Bridges in the City of New York, to take effect May 1, and has accepted the appointment of Chief Engineer of the Dominion Bridge Company at Montreal. Mr. Buck has been for some time in the Department of Bridges, having been Chief Engineer in special charge



of Bridges Nos. 3 and 4, which he designed. No. 3 is the suspension bridge between the old bridge and the bridge now building; No. 4 is the long cantilever bridge across Blackwell's Island. Obviously it must be a matter of regret that Mr. Buck cannot stay to finish these two bridges. He was Engineer in Charge under Mr. L. L. Buck in the building of the Niagara Railway arch bridge and the Clifton bridge just below the Falls; it will be remembered that the latter is the longest arch in the world, and the former is not only an arch bridge of extraordinary span, but of extraordinary weight. These steel arches replace the two suspension bridges which long stood across the Niagara gorge. Mr. Buck was also the Chief Engineer of the Lewiston and Queenston suspension bridge over the Niagara River, and was Consulting Engineer for the State on the bridges of the Niagara Reservation. He is now a Director of the American Society of Civil Engineers.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—B. F. Mills has been appointed General Foreman of Bridges and Buildings. H. T. Herr has been appointed Division Master Mechanic, with headquarters at Ft. Madison, Iowa.

Birmingham Southern.—R. W. Bidgood has been appointed Auditor and Traffic Manager, with headquarters at Birmingham, Ala.

Central of New Jersey.—W. W. Stevenson, General Auditor, has resigned.

Chicago, Burlington & Quincy.—P. S. Eustis, heretofore General Passenger Agent, has been appointed Passenger Traffic Manager, with jurisdiction over all lines, effective April 8.

H. Elliott, heretofore General Manager of the Hannibal & St. Joseph, has been elected Second Vice-President of the C., B. & Q., in charge of operation of the whole system.

Chicago, Rock Island & Pacific.—C. A. Goodnow, heretofore General Superintendent of the Chicago, Milwaukee & St. Paul, has been appointed General Manager of the C., R. I. & P., with headquarters at Chicago, Ill., succeeding A. J. Hitt. Effective April 15.

Chicago Union Transfer.—A. Swantz, Chief Engineer, has resigned, effective April 1.

Dry Fork.—G. T. Hice has been appointed Master Mechanic, with headquarters at Hendricks, W. Va.

Eastern Texas.—F. C. Fogarty, formerly Auditor of the Dallas Terminal, has been appointed Auditor and Treasurer of the E. T., with headquarters at Lufkin, Texas.

Ft. Worth & Denver City.—Milton Player, heretofore Division Master Mechanic of the Atchison, Topeka & Santa Fe, has been appointed Master Mechanic of the Ft. W. & D. C., with headquarters at Ft. Worth, Texas, succeeding G. K. Jackson, resigned.

Frankfort & Cincinnati.—D. W. Lindsey has been appointed General Freight and Passenger Agent, succeeding J. R. Newton, resigned.

Houck's Missouri & Arkansas.—W. E. Harrington has been appointed Division Superintendent, with headquarters at Cape Girardeau, Mo., and A. R. Ponder becomes Division Superintendent at Kennett, Mo. G. R. Harrington succeeds Mr. Harrington as Auditor.

Illinois Central.—J. M. Daly, formerly Superintendent of Transportation of the Delaware, Lackawanna & Western, and for the last few months General Manager of the Cape Breton at Hawkesbury, N. S., has been appointed Superintendent of Transportation of the I. C.

Iowa Central.—Frank Nay has been appointed Auditor, with headquarters at Minneapolis, succeeding T. I. Wasson, General Auditor, resigned.

Illinois Terminal.—G. A. Stratton has been appointed General Freight Agent, with headquarters at Alton, Ill.

Lehigh & New England.—W. J. Young has been appointed Chief Engineer and J. Whalen Reiger becomes Assistant to the General Manager in connection with traffic matters, and will have charge of freight claims.

Louisville & Nashville.—C. W. Bradshaw has been appointed Superintendent of the Owensboro and Nashville Division, with headquarters at Russellville, Ky., succeeding J. R. Wheeler.

Macon, Dublin & Savannah.—H. K. Deale has been appointed Assistant General Freight and Passenger Agent, with headquarters at Savannah, Ga.

Maricopa & Phoenix.—Francis Cutting, heretofore Vice-President, has been elected President, succeeding the late Mr. Smith. Mr. Cutting is succeeded as Vice-President by J. M. Master.

Minneapolis & St. Louis.—J. L. Blake has been appointed Assistant General Freight Agent, with headquarters at Minneapolis, Minn., succeeding R. G. Brown, resigned.

Mobile, Jackson & Kansas City.—H. H. Lane, Superintendent, Secretary and Treasurer, has been appointed General Manager and Assistant to the President. T. W. Greer succeeds Mr. Lane at Mobile, Ala.

Norfolk & Western.—The following appointments in the Accounting Department went into effect April 1: Comptroller, M. C. Jameson; General Auditor, Joseph W. Cox, (reporting to the Comptroller), and Auditor of Receipts, Walter Macdowell (reporting to the General Auditor).

Northern Pacific.—E. J. Pearson, heretofore Division Superintendent at Tacoma, Wash., has been appointed Assistant General Superintendent, with headquarters at St. Paul. N. Kline, Division Superintendent at Glendive, Mont., succeeds Mr. Pearson at Tacoma.

New York Central & Hudson River.—Herbert D. Carter has been appointed Assistant General Freight Agent, with headquarters at Grand Central Station, New York, of this company and the West Shore, succeeding George E. Terry, resigned on account of illness. Norris P. Stockwell has been appointed Acting Supervisor of Bridges and Buildings, with headquarters at Weehawken, N. J.

Omaha, Kansas City & Eastern.—L. A. Irwin has been appointed Purchasing Agent, with headquarters at Kansas City, Mo.

Pennsylvania.—Charles P. MacArthur, formerly Assistant Engineer, has been appointed Principal Assistant En-

gineer of the Buffalo & Allegheny Division, with headquarters at Buffalo, N. Y., succeeding H. P. Lincoln.

Penobscot Central.—James B. Neal has been appointed Superintendent, with headquarters at Bangor, Me.

Philadelphia & Reading.—Charles A. Beach has been appointed Superintendent of the New York Division, and J. B. Warrington becomes Superintendent of the Philadelphia Division.

Southern.—C. S. McManus has been appointed Superintendent of the Charlotte Division, with headquarters at Charlotte, N. C., succeeding W. B. Ryder, resigned.

Southern Indiana.—Since April 5, the headquarters of the General Superintendent, General Freight and Passenger Agent, and the Engineer of Maintenance of Way, have been located at Terre Haute, Ind.

Texas Central.—W. C. Beach has been appointed Resident Engineer, succeeding W. T. Gould, resigned to go with another company.

Vandalia Line.—W. C. Downing, heretofore Superintendent of the Peoria Division, has been appointed Superintendent of the Main Line, succeeding Benjamin McKeen.

Wabash.—S. Cooper has been appointed Division Master Mechanic, with headquarters at Moberly, Mo., succeeding G. W. Mudd.

West Shore.—See New York Central & Hudson River.

Wisconsin Central.—Charles N. Kalk, heretofore principal Assistant Engineer, has been appointed Chief Engineer, succeeding R. B. Tweedy, who has resigned on account of ill health.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

AURORA, ELGIN & CHICAGO (ELECTRIC).—Owing to the enlarged plans of this company, a circular has been sent out by the syndicate stating that the amount already spent, added to the amount realized by the underwriting of \$2,500,000 of the company's \$3,000,000 first mortgage bonds, will not be sufficient, hence the remaining bonds are offered to the underwriters with \$500,000 6 per cent. cumulative preferred stock, each underwriter of five bonds to be entitled to subscribe for 10 shares of the preferred stock at 80, and for one bond at 95, with a 40 per cent. bonus of common stock. When completed, the road will operate (by third rail) 81 miles of track, part single and part double. A report by Vice-President Wolf states that approximately \$1,000,000 additional will be required for the work.

BELLAIRE, ZANESVILLE & CINCINNATI.—An officer writes in reference to the organization of the International Coal Co. and reports of its interest in this line, that the company was organized for the purpose of developing coal lands along the line of the railroad, and the work proposed in the near future will involve standard gaging of at least a portion of the line and perhaps the building of a new line. Definite arrangements, however, have not been completed. (April 4, p. 257.)

BELLINGHAM BAY & BRITISH COLUMBIA.—Announcement is reported that this line is to be extended at once from Maple Falls, Whatcom County, Wash., across the Cascade Mountains, to Methow. Surveys are to be made at once and it is planned to start building in June. The proposed extension will provide an outlet for a mining country. D. O. Mills and others of San Francisco are interested.

BUFFALO, ROCHESTER & PITTSBURGH.—An officer writes that an extension 28 miles long is to be built from a point two miles north of Punxsutawney, Pa., south into coal fields in Indiana County. Contract was let April 1 to A. E. Patton, of Curwensville, Pa., for grading and masonry, and there will be several steel bridges for which contracts have been let to the American Bridge Co. The line will be laid with oak ties and 80-lb. rail, with stone and cinder ballast. Contract has also been let to E. C. Lauer, of Rochester, for six miles of second track on the main line between Falls Creek and Lanes Mills, and to L. B. Fitch, of Rochester, for nine miles of second track between Johnsonburg and Ridgeway, on the main line. There are a number of bridges on this work, all of which have been let to the American Bridge Co. The company is also building, with its own forces, five miles of double track out of Carrollton. This includes rebuilding the masonry of several bridges and the renewal of steel structures, single track spans being replaced by double. A reduction of grades will also be made on this five miles of line, reducing the former grade of 52 ft. to the mile, to 21 ft. An undercrossing at South Park avenue at the city limits of Buffalo has been ordered by the Railroad Commissioners. This work is also under contract and will be completed during the present season. The work for the year will also include re-laying 20 miles of the line with new rails, in addition to general betterments.

CANADIAN PACIFIC.—Contract to build the branch from Moosemin, Assiniboia, N. W. T., through the Qu'Appelle Valley, has been let to James Welch, contractor, of Winnipeg, Man. (Construction Supplement, March 14, 1902.)

CATAWA VALLEY.—It is said that work will begin at once on this new line in Virginia, from Salem to New Castle, in Craig County, 15 miles, making connections with the Norfolk & Western at Salem, and with the Chesapeake & Ohio at New Castle. It is said that a branch will also be built from this line up Craig Creek to Blacksburg, a distance of 22 miles, with further extensions to the Brush Mountain coal fields contemplated.

CENTRAL FLORIDA & GULF COAST.—This company, which proposes to build a railroad from Plant City south to Boca Grande, Fla., a distance of 135 miles, has made a mortgage to the Standard Trust Co. of New York, to secure \$2,000,000 of bonds.

CHARITAN VALLEY.—This railroad was chartered March 31 in Missouri, to build through what is known as Charitan Valley from Novinger to some point on the Quincy, Omaha & Kansas City. It will parallel a line recently built by John W. Gates, with which it will compete for the coal trade in the valley.

CHESAPEAKE & WESTERN.—It is said that this railroad, which now has 27 miles in operation in the Shenandoah Valley, Va., is to be extended 100 miles through a coal district in West Virginia to a point near Parkersburg. Work is reported in progress from the Shenandoah and Allegheny Mountains into West Virginia.

CHICAGO & EASTERN ILLINOIS.—New surveys are reported for a cut-off line to connect the Terre Haute with the Brazil Division at a point just north of the Brazil district coal mines, Indiana. This new line leaves the Terre Haute Division near Hillsdale, crosses the Wabash and

extends across the hills to a point near Perry's mine on the Brazil Division. The distance is three miles and a haul of 38 miles would be saved, but the work is extremely heavy and would involve a very large bridge. Surveys in this locality have been made before.

CHICAGO & MILWAUKEE ELECTRIC.—This company was recently incorporated in Illinois, to build an electric line from Chicago, in Cook and Lake Counties, running through a large number of towns.

CHICAGO GREAT WESTERN.—The holders of the 4 per cent. debenture stock, and the 5 per cent. preferred stock "A" have authorized the company's directors to issue \$3,437,000 of additional 4 per cent. debenture stock, the proceeds of which are to be applied for general betterment of the line, second track and shortening the route between South St. Paul and Randolph, Minn., purchase of new rolling stock, etc. The sale of certain branch lines to the Mason City & Fort Dodge was also authorized, in payment of which bonds are to be accepted and the proceeds of these bonds will provide for building 40 miles of second track between Oelwein and Chicago.

Work is reported begun on the extension of the Mason City & Fort Dodge branch to Council Bluffs, on the section which commences about seven miles northeast of Council Bluffs. The work in that locality will be very heavy.

CHICAGO, MILWAUKEE & ST. PAUL.—Contract for 100 miles of double track between Brookfield and Watertown, Iowa, and from Portage to Tomah, was reported let March 29, to McIntosh Bros., of Milwaukee. Work is to be begun at once and will, it is said, be completed Oct. 1. (April 4, p. 257.)

CHICAGO, ROCK ISLAND & PACIFIC.—The Chicago, Rock Island & Texas on March 31 filed an amendment to its charter providing for an extension from Fort Worth to Galveston by way of Dallas, Corsicana and Houston, through the counties of Tarrant, Dallas, Ellis, Navarro, Freestone, Leon, Madison, Grimes, Montgomery, Paris and Galveston, an approximate distance of 295 miles. Surveys are now reported locating this new line which, it is said, will be built, in whole or in part, as soon as possible.

CHICAGO, ROCK ISLAND & TEXAS.—An officer writes that contract has been let for grading and bridging to Crane Bros., for the new extension from Jacksboro to Graham, Tex., 26 miles. Surveys have also been run to the southeast of Fort Smith, but it is not known at present what building will be done in that direction. S. B. Hovey is Vice-President and General Manager.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—Contract for ballasting the track between Williamstown and Cincinnati, 35 miles, is reported let to the American Stone & Ballast Co., Cincinnati. Work is to begin at once at the Williamstown end, and the estimated cost is about \$50,000.

COLUMBIA SOUTHERN.—According to recent reports, surveys for the projected extension of this road in Michigan from Shaniko to Crooked River, a distance of 72½ miles, have been completed. The Columbia Southern was incorporated last January to build from Shaniko to Bend, Ore., 100 miles, and the survey just completed is said to cover the most difficult part of the work. A. E. Hammond is Chief Engineer.

CONCORD & MONTREAL (ELECTRIC).—The electric branch of this railroad is reported completed from Concord, N. H., to Hooksett, N. H., 10 miles, and it is said that it will be in operation as far as Manchester, 18 miles, some time this summer. Half of the \$1,000,000 of bonds authorized to pay for the work have been issued and interest on these is guaranteed by the Boston & Maine.

COPPER RANGE.—It is said that work on the 15-mile extension from Houghton, Mich., to Calumet, for which surveys were made last year, will begin as soon as the map is approved by the Railroad Commissioners. The contract has been let and forces to carry on the work are at hand.

DELAWARE GENERAL ELECTRIC.—It is said that this company will be organized with Secretary of State Caleb R. Layton, Geo. W. Marshall and others as incorporators, to build a 32-mile electric road through Kent County, Del.

DURANGO CENTRAL.—This company was recently incorporated in New Jersey to build railroads and operate telegraph and telephone lines in the State of Durango, Mexico. The incorporators are: Edward J. Patterson, Plainfield, N. J.; J. F. Eagle and G. L. Wakefield, of New York.

EASTERN RAILWAY OF ALABAMA.—A mortgage executed by this company to the Alabama Mineral was filed recently for \$300,000. The Eastern Ry. of Alabama is projected from Talladega, Ala., to Pyrites, Clay County, about 20 miles. The Alabama Mineral Co. is controlled and operated by the Louisville & Nashville.

FLORENCE, IRON, PHOSPHATE & RAILROAD.—Grading on this new line to open up phosphate lands in Tennessee and adjacent States is reported completed for 30 miles, and it is said that a stretch 50 miles long from Florence, Ala., to Mannine, Tenn., through phosphate lands owned by the company will be completed this year. (Construction Supplement, March 14, 1902.)

GRAND TRUNK OF CANADA.—An agreement has been finally drawn up between the officers of the company and the town officials of Brantford, Ont., in accordance with which a company will build a spur line four miles long to connect Brantford with the main line of the railroad, at an estimated cost of \$80,000, exclusive of strengthening several bridges and improving the line in other ways. The company also agrees that whenever any important industry employing not less than 225 hands is located in the Homedale district, a suburb of Brantford, a siding will be built to it. Provision is also made in the agreement for a spur 30 ft. wide for street traffic and for other improvements. (Construction Supplement, March 14, 1902.)

GREAT NORTHERN.—Franchise has been asked for a tunnel from the northern part of Seattle, Wash., to connect with the company's present terminals on Third avenue.

HALIFAX & YARMOUTH.—The bill ratifying the contract made by the Nova Scotia Government with Mackenzie & Mann for this road, has been passed. In accordance with the contract, the Government agrees to loan the company at 3½ per cent. the sum of \$13,500 per mile, in addition to the subsidy of \$3,200 per mile. The estimated cost of building the line is \$18,000 a mile. The proposed length is slightly over 100 miles, all of which has been surveyed, and it is said that work will begin at once. (July 3, 1901, p. 492.)

IMPERIAL & GULF.—Location is reported in progress on this projected line in California, incorporated last March, to build from Imperial Junction, on the Southern Pacific, to Imperial, 30 miles. It has been decided to push the grading as rapidly as possible, and it is hoped that

the line will be completed this summer. The work is very easy. (March 21, p. 217.)

IOWA CENTRAL.—Contract has been let to the Walsh Construction Co., of Davenport, Iowa, to revise the location of six miles of track near Searshoro, Iowa, on the line between Marshalltown and Oskaloosa. (Construction Supplement, March 14, 1902.)

KNOXVILLE, LAFOLLETTE & JELICO.—Charter was granted this company in Tennessee April 4, to connect Jellico, the present terminus of the Louisville & Nashville, with Knoxville. Terminal property is reported bought in Knoxville and a considerable right of way acquired.

LAFAYETTE.—The capital stock of this railroad in Alabama, which now operates between Opelika and Lafayette, 22 miles, has been increased \$100,000 in order to build a line into Clay County. Surveys have been made from Lafayette to Motley, 23 miles northwest.

LOUISIANA & ARKANSAS.—Eighteen miles is reported completed on the extension of this line from Ashland to Winfield, La., 33 miles, and it is said that the remainder has been graded. G. Knobel is the Engineer in charge of construction.

MANISTIQUE & NORTHWESTERN.—Articles of incorporation were filed April 2 in Michigan, for this company, with a capital of \$2,000,000, to succeed the Manistique & Northeastern, and build the necessary connecting links for a line between Grand Rapids and Marquette. This revives the old project of running a line of car ferries between Northport and Manistique, and will, if carried out, shorten the distance 85 miles between Grand Rapids and Marquette.

MANITOULIN & NORTH SHORE.—Surveys are reported completed for the portion of this line on the Bruce Peninsula, Ont., between Wiarton and Tobermory, 50 miles. The road is projected between Sudbury and Little Current, Ont., with branches. (Construction Supplement, March 14, 1902.)

METHOW RAILWAY & SMELTING.—It is said that work will begin July 15 on this proposed railroad along the Methow River, Washington, to its junction with the Twisp and thence up the Twisp. The line will run from Pateras at the junction of the Methow with the Columbia, and will be about 100 miles long. It was incorporated last February. (Construction Supplement, March 14, 1902.)

MEXICAN GREAT EASTERN.—It is said that this company will take over the Xico & San Rafael, running between the City of Mexico and Apasco, and extend it to Coatzacoalcas, with branches aggregating 80 miles. Wm. Mackenzie, of the City of Mexico, is President.

MUSKOGEE & WESTERN.—W. W. Townsend, room 1,112, Merchants Loan & Trust Bldg., Chicago, is advertising for proposals for the furnishing of all material and work for about 158 miles of this company's proposed line in Indian Territory and Oklahoma. Bids will be received until noon, April 12. (Dec. 6, p. 850.)

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Contract for building the remaining 7½ miles of the 10-mile extension of the Bon Air branch to mines of the Bon Air Coal Co., at Ravenscroft, Tenn., has been let to Brooks Bros. & Co., who are now building the first 2½ miles of this same extension.

NEWPORT & SHERMAN'S VALLEY.—Surveys are reported for a 50-mile extension of this railroad to run from the present terminus through Franklin and Perry Counties, Pa., south to Hancock. A line between Newport and New Germantown, Pa., 28½ miles long, is now operated. M. M. Drebellis is the Engineer in charge of surveys.

NEW YORK & JERSEY CITY TERMINAL UNDERGROUND.—This company was incorporated at Albany April 8, to build an underground tunnel between New York and Jersey City. So far as can be ascertained, it is not connected with any of the previous projects. It is proposed to enter New York at the Battery. The directors are: Henry M. Black, James M. Fisk, Chas. E. Dodge and others of New York City.

NEW YORK CENTRAL & HUDSON RIVER.—Work is reported begun on the proposed double track of the Fall Brook Division. The Fall Brook Division extends from Jersey Shore, Pa., to Lyons, N. Y., 169 miles.

OKLAHOMA & TEXAS SOUTHERN.—Contract has been let to B. F. Hanner & Co., of Montague, Texas, for the first 10 miles of this new line which is projected to run from a point on the Red River, Montague County, Texas, near Spanish Fort, south to Houston. (Construction Supplement, March 14, 1902.)

PENNSYLVANIA.—It is said that a large tract of land has been acquired in South Buffalo, N. Y., near the new plant of the Lackawanna Steel Co. This is to be converted into large freight terminals which will permit the Pennsylvania to handle its business direct from the new harbor instead of by means of the Buffalo Creek R. R.

PORTLAND, NEIALEM & TILLAMOOK.—It is said that negotiations are in progress to begin work on this projected line from Portland, Ore., to the Tillamook country, a distance of about 90 miles. J. McCracken, of Portland, Ore., is President.

QUEEN ANNE'S.—It is said that this company will increase its capital to \$3,000,000 in order to build an extension 60 miles long from Denton, Md., by way of Federalburg and Salisbury to Snow Hill, with the ultimate intention of continuing the line to a point at or near Cape Charles.

QUEBEC SOUTHERN.—Tenders have been asked for a South Shore extension about 70 miles long, from Nicolet, Que., to Chaudiere, along the St. Lawrence River. (Construction Supplement, March 14, 1902.)

RICHMOND, FREDERICKSBURG & POTOMAC.—Contract is reported let to Phillips & Allport, of Richmond, Va., for grading this line between Richmond and Ashland, where second track is to be laid.

SALT LAKE & UTAH VALLEY (ELECTRIC).—This company, with headquarters at Ouray, Colo., has been recently incorporated in Utah with the purpose of building an electric road from Salt Lake City to Provo. The air line distance between these points is about 45 miles and the Rio Grande Western now operates a line between them. The directors are: L. L. Nunn, Wm. Story, A. M. French and others, who may be addressed at Ouray.

SAN DIEGO EASTERN.—Chief Engineer Richardson, who is at work on the surveys of this proposed line between San Diego and Yuma, reports change of survey, giving to the first 30 miles from San Diego a grade of 1 per cent., and a maximum for the greater part of the distance of 1.4 per cent. This seems to be the same project which has been previously recorded in the *Railroad Gazette* under the name of the Arizona Central, and which was incorporated last July. (Construction Supplement, March 14, 1902.)

SANTA FE CENTRAL.—Contract to build this proposed line from Santa Fe, N. Mex., to Chameleon, has been let to the Pittsburgh Construction Co., and work is to begin next fall. The distance is about 120 miles.

SOUTHERN PACIFIC.—It is said that work will begin at once on the proposed cut-off from Cochise, east of Benson, south to Tombstone and Pearce, Ariz., and on the north to Naco, where connection will be made with the Cananea line into Mexico.

An officer writes that contract for rebuilding 27 miles of the Central Pacific between Moor and Toano, Nev., has been let to Kilpatrick Bros. & Collins. (Construction Supplement, March 14, 1902.)

TAMPA MUNICIPAL WEST COAST DEVELOPMENT.—Application for a charter was made April 2 by this company which proposes to build a street railroad and electric light plant in Tampa, Fla., and also to build an electric railroad system, with Tampa as a center, involving 200 miles of line.

TEMISKAMING & NORTHERN.—At the recent session of the Ontario Legislature the survey of the route of this line was discussed. It will start from North Bay, Ont., and run north and east through Widdfield, Stewart and Hammell. The line touches the northeastern arm of Lake Temagaming and then runs through the Temagaming Forest Reserve to Thornloe, on Wabias Bay, which is an inlet of Lake Temiskaming. Fifty miles have been located already from North Bay and are ready for building, and a preliminary line, subject to revision, has been run for the entire distance. The bill has passed the House and tenders will shortly be called for by the Government to build the first 50 miles. W. B. Russell is the Government Engineer who has made the surveys, and it is said that the Government will appoint Robert Jaffray, of Toronto; M. J. O'Brien, of Renfrew, and B. W. Folger, of Kingston, as a commission to supervise building.

TENNESSEE & NORTH CAROLINA.—It is reported that 18 miles of the 20 miles proposed between Newport, Tenn., and Big Creek, N. C., has been graded and is now ready for track laying. F. F. Holloway, of Wheeling, W. Va., is President and General Manager.

TRANS-CANADA.—Notice is given that application will be made to the Parliament of Canada at its present session for an act declaring the corporate powers of this company in full force and effect; to consolidate and amend the acts relating to the company; to extend the time for the building and completion of the railroad begun at Roberval; to grant the company running powers over the Quebec & Lake St. John from Roberval to Quebec, and Chicoutimi; to increase the number of directors; and for other purposes. Hamel, Tessier & Tessier, solicitors.

TUSCARORA VALLEY TRACTION.—This company was incorporated in New York April 4, to build an electric railroad about 25 miles long in the south part of Steuben County, N. Y., passing through the towns of Addison, Tuscarora, Jasper and Woodhull. The directors are: H. A. Clark, of Corning; C. A. Brewster, of Addison, and others.

WEST VIRGINIA ROADS.—Work is reported begun on a new lumber line five miles long which runs from a connection with the Baltimore & Ohio at Crabtree, to a timber tract near Piedmont, recently acquired by DuBois & Bond Bros.

WHITE RIVER (MISSOURI PACIFIC).—According to most recent reports, 20 miles of track have been laid northwest from Cushman's, Ark., and 60 miles more are building.

GENERAL RAILROAD NEWS.

ATLANTIC COAST LINE.—As the result of a conference held in New York April 4, between Atlantic Coast and Plant interests, the following statement was authorized:

"Negotiations have been completed under which it is arranged that the Savannah, Florida & Western will, on or before July 1, 1902, be consolidated with and become the property of the Atlantic Coast Line. The negotiations also contemplate that the other railroad properties of the Plant system will pass under the control of the Atlantic Coast Line at the same time.

"It has also been agreed that when the consolidation takes place the Southern Railway will have trackage rights thereafter for all of its trains, both passenger and freight, over the line between Savannah and Jacksonville, thus making Jacksonville the Southern terminus of the Southern Railway for its Florida service to and from the East and West."

The Atlantic Coast Line, which was organized in 1899, under the laws of Connecticut, now owns or controls a connected series of railroads between Richmond and Norfolk, Va., and Wilmington, N. C., Charleston and Port Royal, S. C., and Augusta, Ga., with trackage to Atlanta. The total mileage operated is 2,176 miles. The Plant System operates a total mileage of 2,141. It is thought that the transfer of properties now to take place is a result of a recent decision of the courts in a contest of the will, brought by Mrs. Plant, in which H. B. Plant, deceased, was declared to have been a resident of New York. Owing to the difference between the laws of New York and the laws of Connecticut, it was hence impossible for the estate to be further entailed. Mr. Plant had sought to make himself a resident of Connecticut in order to take advantage of the law of that State which allowed a provision in his will that no partition of the estate should take place until the majority of his grandson's eldest son. The grandson was only four years old at the time of Mr. Plant's death. There is said to be no capital stock outstanding in the hands of the public of the several corporations composing the system, all of which are owned by the Plant Investment Co.

CHICAGO, ROCK ISLAND & PACIFIC.—At a meeting of the shareholders June 4, proposition will be made to increase the capital stock from \$60,000,000 to \$75,000,000. The detailed purposes of the new funds are not stated except that they are to be applied to corporate purposes at the discretion of the directors or executive committee.

CHOCTAW, OKLAHOMA & GULF.—Edward B. Smith & Co., of New York and Philadelphia, offer \$1,750,000 4½ per cent. car trust certificates, series C, which were issued by the Girard Trust Co. for rolling stock leased to the Choctaw, Oklahoma & Gulf, consisting of 50 engines, 18 coaches and 2,100 freight cars, required to meet the increasing demands of the company's business. The issue is limited to 80 per cent. of the cost of equipment securing it, 12½ per cent. of which is paid off each year. The certificates are dated April 1, 1902, and are in eight series of substantially even amounts, maturing April 1 each year from 1903 to 1910, inclusive.

CINCINNATI, GEORGETOWN & PORTSMOUTH (ELECTRIC).—The old stock and bonds of this line, purchased last year by A. W. Comstock, of Detroit, and now being equipped with electricity, have been retired and a new issue of \$1,500,000 stock has been created, together with a new mortgage to secure \$1,000,000 of 5 per cent. gold bonds. Of these bonds, \$200,000 are to be reserved

for future extensions and the remainder applied to the improvements now in progress.

COPPER BELT RAILWAY & POWER.—At a recent meeting of shareholders an issue of \$2,000,000 38-year 5 per cent. bonds was authorized. The proceeds of these are to be applied to the building of a new electric line between Bully Hill and Kennet, Cal.

GEORGIA RAILWAY & ELECTRIC.—H. W. Poor & Co., of New York, and Curtis & Sanger, of Boston, offer at 98 and interest, subject to prior sale or advance in price, \$850,000 bonds, which are the unsold balance of the \$4,000,000 issue. The Georgia Railway & Electric Co. is a consolidation of the street railroad and electric light companies of Atlanta, Ga., and its capitalization April 1, 1902, consisted of \$5,000,000 common stock, \$1,800,000 preferred stock, outstanding bonds present issue of \$1,000,000, authorized \$4,000,000, and reserved to retire outstanding bonds on property consolidated, \$3,850,000, making a total of \$7,850,000. The balance of \$3,150,000 are issuable only as provided in the mortgage. The company is free from floating debt and the \$4,000,000 first consolidated bonds now issued will be a first mortgage on about half of the company's street railroad system, including the new power house just completed, steam heating plant, etc.

HAWKINSVILLE & FLORIDA SOUTHERN.—On April 3, Secretary of State Philip Cook, of Georgia, recorded an issue of \$400,000 50-year 5 per cent. gold bonds, issued by and on the property of the Hawkinsville & Florida Southern. The road owned by this company is 44 miles in length and runs from Pitts, in Worth County, to Hawkinsville. It was chartered by the Secretary of State on May 25, 1896.

IOWA ROADS.—The Governor on March 25 vetoed the Molsberry bill which sought to remove the limit of indebtedness of railroad corporations organized under the laws of Iowa, and operating lines both within and without the State. The Governor based his veto on the grounds that the bill was unconstitutional and opposed to public policy; unconstitutional, because it only applies to three railroads, the Burlington, the Rock Island and the Burlington, Cedar Rapids & Northern, and is therefore class legislation; and opposed to public policy because the real application of the bill would not tend to enable the two or three companies to which it would apply to use their profits for the advantage of the people, but that its only substantial effect would be to overrule real or imaginary difficulties growing out of the purchase of stock of the Chicago, Burlington & Quincy by the Great Northern and Northern Pacific. This, he insists, is not in accordance with the best interests of the people. It is not thought likely that the bill will be passed over the Governor's veto.

KANSAS CITY, FORT SCOTT & MEMPHIS.—F. J. Lisman & Co., New York, offer 15,000 shares of Kansas City, Fort Scott & Memphis 4 per cent. preferred stock trust certificates, on which the dividends are guaranteed by the St. Louis & San Francisco, and are a direct obligation on the latter. The price is \$4 and accrued dividends.

RUTLAND.—Lee, Higginson & Co., of Boston, offer \$1,500,000 4½ per cent. gold car trust bonds, dated April 1, 1902, and constituting the company's entire issue. These mature at the rate of \$100,000 each year from 1902 to 1917, inclusive, and are a direct obligation on the Rutland R. R. They are issued on account of increasing traffic and the stock will consist of 38 locomotives, 41 cars for passenger service, 1,311 freight cars, and four cars for road service. The American Loan & Trust Co. is trustee.

ST. LOUIS, MEMPHIS & SOUTHEASTERN.—An officer writes that the jurisdiction of the officers of the St. Louis, Memphis & Southeastern was, on March 1, extended over the St. Louis & Memphis. The purchase of the latter property is now completed and, beginning April 1, it was operated as a part of the lines of the St. Louis, Memphis & Southeastern. (Jan. 31, p. 86.)

SEABOARD AIR LINE.—Application has been made to the Stock Exchange to list \$12,775,000 first mortgage 48-year 4 per cent. gold bonds, and \$10,000,000 collateral trust refunding 5 per cent. gold bonds of 1911.

WESTERN MARYLAND.—Hambleton & Co. quote a telegram from President Ramsay, of the Wabash, to Mayor Hayes as follows: "The items published in Baltimore papers regarding reported statements of mine as president of the Wabash Company, while correct in part, are very misleading, and might result, if left uncontradicted, to the injury of Baltimore as a city. I did say that the Wabash Railroad Company would not buy the Western Maryland, nor was it financially interested in the Fuller or West Virginia Central syndicate. I also said at the same time to the reporter who called on me: 'If you publish this statement, also state that in my opinion Baltimore will make a great mistake if it does not sell the Western Maryland to the West Virginia Central syndicate, as it owns the West Virginia Central Railway and will build to a connection with lines controlled by Wabash interests, and thus give Baltimore a direct connection with the Wabash system.'

"Since my return to New York I have seen a list of syndicate underwriters, and I know that the statements made by the West Virginia Central syndicate regarding the controlling interests, extensions and Western connections are correct. I wire you direct, as I do not wish you to be misled by any statements which have been made or may be made of interviews with me."

Hambleton & Co., in commenting on the situation say: There is absolutely nothing in this telegram which even intimates that the Wabash proposes to make Baltimore the terminus of its system, and the only assurance given is that the Fuller Syndicate will extend the West Virginia Central & Pittsburgh to a connection with the Wabash.

They also quote the following from the *New York Commercial*: "The best of grounds exist for the belief that the Gould interests have practically completed arrangements for the extension of the Eastern terminus of the system of roads controlled by them to the seaboard."

"The project is known as the Chesapeake Western Railroad. It begins at Gloucester Point, York Harbor, Va., where a large acreage of land for tidewater terminal has been bought. The line of road runs northwest and west, and takes in the Chesapeake and Western Railroad, 27 miles, built and in operation, in the Shenandoah Valley, and already owned by the syndicate. It moreover runs through 100 miles of the coal fields of West Virginia, to a point near Parkersburg. Construction work on more than 100 miles of the line, west through the Shenandoah and Allegheny Mountains into West Virginia, is now under way, with 14 miles of track laid, and more than one-half of the entire line has been surveyed and located, estimates of construction made thereon, and preparation now being completed for general construction."